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Plastic-Tape Sound Spectrograph

A. J. Prestigiacomo

In the study of speech parameters, a method of analyzing and viewing the sounds of speech is essential. The sound spectrograph developed by the Bell Telephone Laboratories has fulfilled the necessary requirements, and the instrument has found wide application. This article will describe briefly the original sound spectrograph, known as the 'Model D,' and the Sonograph which was later developed for commercial use. This review will serve as a basis for the description of the latest model, known as the Plastic-Tape Sound Spectrograph.

The principle of sound spectrography involves two basic steps: first, the signal to be analyzed is heterodyned with a variable-frequency, sine-wave oscillator; second, the result is inserted into a narrow band-pass filter and the beat-frequency output is measured. As can be seen in the block diagram of Figure 1, the signal to be analyzed is recorded on a magnetic drum which is capable of storing approximately 2.5 seconds of material. In order to shorten the analyzing time, the recording is played back at several times the recording speed.

In the analysis, the recorded signal is played back many times as the variable-frequency oscillator slowly shifts in frequency. The signal frequency necessary to produce an output from the band-pass filter is equal to the difference between the carrier-oscillator frequency and the center frequency of the band-pass filter. The output of the band-pass filter is amplified by a marking amplifier and fed to a stylus which marks on electrically-sensitive facsimile paper. The density of the line marked is roughly proportional to the logarithm of the amplitude of the beat-frequency component. The paper is wrapped around a metal cylinder which rotates in synchronism with the magnetic drum. Since a mechanical linkage slowly moves the stylus across the cylinder, the picture is constructed of a series of parallel lines. In this manner it is possible to make a permanent frequency-amplitude versus time portrayal of the recorded signal.

Since the facsimile paper is capable of only a 12-decibel range from the lightest gray to the darkest black, a means of making a frequency versus amplitude portrayal at any point along the time dimension is also provided. This technique is known as amplitude cross sectioning (*1*).

Anthony J. Prestigiacomo is a Technical Staff Associate at the Bell Telephone Laboratories, Acoustic Research Department, Murray Hill, New Jersey. The initial phases of the construction of the plastic-tape sound spectrograph were carried out with Dr. Gordon E. Peterson, formerly of the Bell Telephone Laboratories, and were completed by the author.

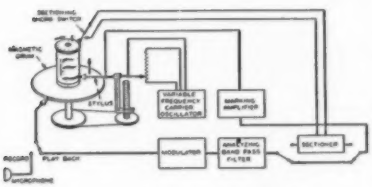

FIGURE 1. Simplified block diagram of a sound spectrograph.

A sample of a typical spectrogram and cross section at the points indicated is shown in Figure 2. For the spectrogram, time is shown along the horizontal axis and frequency along the vertical axis. Relative amplitude is seen as the degree of blackness. The cross sections show frequency along the horizontal axis; the relative amplitudes of the harmonics are shown in decibels by the lengths of the spikes. An amplitude cross section is obtained by inserting a cam on the marking drum at the point to be sectioned. Diagramatically, Figure 1 shows a cam-operated microswitch which sequentially operates the sectioning circuits.

The sectioning circuits consist of an averaging capacitor, a d-c amplifier, and a free-running multivibrator. When the microswitch is operated by the cam, the capacitor charges to the average value of the rectified signal output of the band-pass filter. The customary duration of this integration process is about twenty milliseconds. After the microswitch is released, the voltage on the capacitor keeps the multivibrator turned on until the capacitor has discharged to a threshold value which biases the multivibrator to the off condition. Thus, the length of marking is proportional to the logarithm of the output voltage of the band-pass analyzing filter.

Model D Spectrograph. In the Model D spectrograph, Vicalloy tape was used for magnetic recording. This tape was wrapped around a twelve-inch turntable and butted at the ends to form a closed loop. The magnetic heads were of a scissors type construction, so that the poles contacted the tape on both sides. The Vicalloy tape has very good wearing qualities but is subject to damage if not handled carefully. Periodically, the pole pieces have to be replaced because of wear at the pole tips.

In the Model D sound spectrograph, a speed-up ratio of three to one is used; thus a recorded bandwidth of 75 to 3500 cps is multiplied up to 225 to 10500 cps. Since the analyzing filters are placed at 12000 cps, the carrier oscillator scans from 12000 to 22500 cps. The recorded signal is played

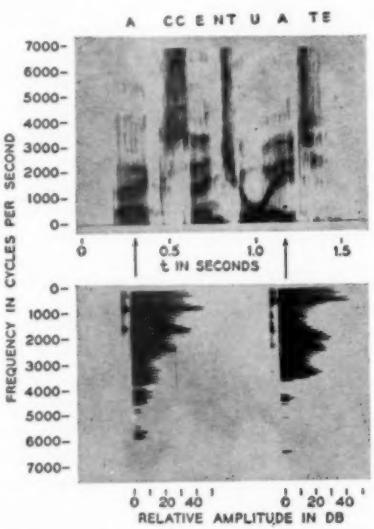

FIGURE 2. A typical spectrogram and amplitude cross section.

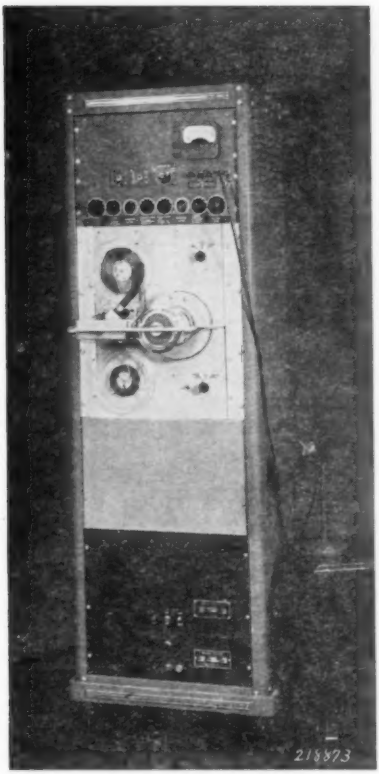

FIGURE 3. Mechanical assembly of plastic-tape sound spectrograph.

back two hundred times as the carrier-oscillator frequency slowly shifts across the band. The marking stylus also moves slowly across the paper and draws one line for each scan of the recorded signal. Each line represents a frequency increment of approximately 17.5 cps. Two analyzing filters are provided with effective bandwidths of 45 to 300 cps. The wide filter is normally used for formant analysis, while the narrow filter is used to show individual harmonics and for amplitude cross sections.

Sonograph. In the Sonograph, the Vicalloy tape was replaced with a nickel-alloy plating on the outside edge of a brass turntable. Conventional record and playback heads are used which are lapped against the recording medium. The plated medium has good wearing qualities, as well as an improved frequency response.

Plastic-Tape Spectrograph. The high-quality signal recording which is possible with plastic magnetic tape suggested the use of this medium in the basic design of a sound spectrograph. With this technique it is possible to record a tape on another, properly aligned, machine and to insert it directly onto the spectrograph for analysis. A great deal of flexibility is thereby achieved, in addition to the elimination of the re-recording process. Also, such a tape may be recorded at other speeds in order to shift the signal frequency range displayed by the spectrograph.

The Plastic-Tape Spectrograph makes use of standard ¼ inch plastic-backed tape as the recording medium. As can be seen in Figure 3, the mechanical assembly has provision for mounting two seven-inch tape reels on either side of a pair of tape guide drums. The section of tape to be analyzed is wrapped around the edge of the two drums which have a separation of 1/10 of an inch. The erase, record, and playback heads are mounted within the drums and protrude between them to contact the inner surface of the tape. The magnetic heads revolve within the drums while the tape and drums remain stationary. Two speeds are provided by a dual-speed motor. The slow speed, used for recording and normal play-

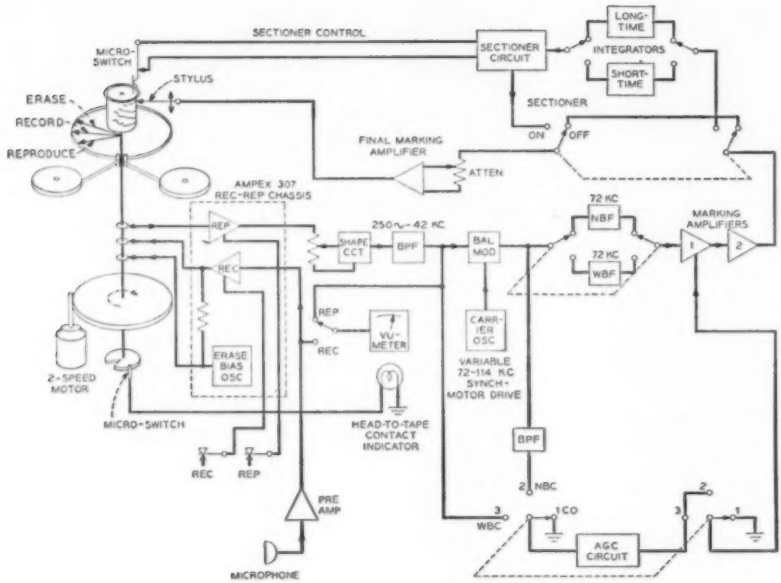

FIGURE 4. Block diagram of plastic-tape sound spectrograph.

back, gives a head-to-tape velocity of 7.5 inches/second with a loop time of approximately 2.8 seconds. A speed-up ratio of 6:1 is used for analysis, giving a head-to-tape velocity of 45 inches/second.

The Ampex Model 307 system is used for recording and playback. This unit was designed for a 30 or 60 inch/second playback speed. The recorder section of the Ampex 307 records with a constant-current (flat-frequency) response. The playback amplifier is provided with high- and low-frequency equalization and corrects for a playback speed of 45 inches/second. Frequencies from 50 to 7000 cycles may be analyzed if the signal is recorded at 7.5 inches/second. When the analyzing speed is used, this frequency band is multiplied by six so that the highest frequency becomes 42 kc.

A block diagram of the Plastic-Tape Spectrograph may be seen in Figure 4. A signal picked up by the microphone is amplified by a preamplifier on the analyzer chassis. In order to record a signal on the spectrograph, the recording tape is first clamped into position around the guide drums with just enough tension to keep the drums from rotating when the scanning heads are set in motion. The guide drums and scanning heads are able to rotate independently to minimize wear on the tape. The motor is then switched to the slow speed and the record button is depressed. The total time for one full revolution is three seconds. However, since the tape does not form a closed loop, the

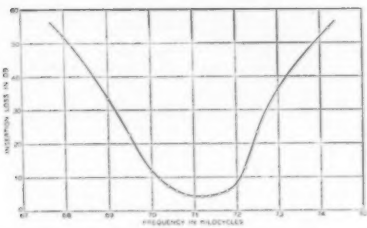

FIGURE 5. Response characteristic of wide-band analyzing filter.

magnetic heads contact the tape for about 2.8 seconds. A light mounted next to the V-U meter shows when the recording head is in contact with the tape. The signal to be recorded is started at the beginning of the loop and retained by depressing the reproduce button at the end of the loop.

At the analyzing speed, the band of frequencies from 250 to 42000 cps is equalized by the playback amplifier and fed to the analyzing chassis. The block labeled shape circuit in Figure 4 has two equalization conditions. One condition gives a flat-frequency response for normal analysis and the other gives a 6 db/ octave rise in frequencies above 300 cycles to emphasize high-frequency energy for constructing speech spectrograms.

The carrier oscillator which is modulated by the reproduced signal is gradually shifted from 72 kc to 114 kc by a tuning condenser driven by a synchronous motor. The analyzing filters (narrow band or wide band) and the marking amplifiers are tuned at 72 kc.

The marking drum is mounted on the same shaft as the scanning heads. To make a spectrogram, a sheet of electrically sensitive paper is placed on the drum and the marking stylus is placed in contact with the paper. A time of five minutes is required for one complete scan of the carrier oscillator during which time the stylus draws 600 lines across the paper in a width of four inches. The frequency extent of each line is approximately 11.7 cps.

There is a choice of two analyzing filters having actual bandwidths of 1800 cps and 280 cps. However, due to the speed-up ratio of 6:1, the effective bandwidths are 300 and 47 cps. The best resolution of resonance movements in speech sounds is given when the wide filter is used and the best resolution of harmonic structure is given when the narrow filter is used. These bandwidths, in fact, give quite satisfactory results for many types of signals. Probably more important than the actual bandwith used is the shape of the filters. The transmission characteristics of the filters in the pass band should be free of irregularities, while the rate of attenuation outside the pass band should not be so great that excessive ringing and delays will result. Of the two analyzing filters used, the build-up time of the narrow-band filter is inherently slower. The shape of the narrow-band filter is chosen by compromising between good harmonic resolution and the time required for the filter to

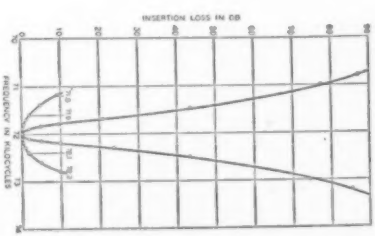

FIGURE 6. Response characteristic of narrow-band analyzing filter.

build up to a steady-state value. Figures 5 and 6 show the insertion loss of the analyzing filters used in the Plastic-Tape Spectrograph. The lower 10 db, in the curve of Figure 6, is also shown drawn with an expanded frequency scale to emphasize the nature of the response in the pass band.

The box labeled AGC in Figure 4 is an automatic gain control for the first-marking amplifier. Two types of AGC or no AGC may be selected. One type of automatic gain control is called narrow-band control. In this case, a band of frequencies only a few hundred cycles wide and centered around the frequency being analyzed is fed to the gain control circuit. This control reduces the stronger components of the signal and allows the weaker components to be brought up into the marking range. The second type of automatic gain control is known as wide-band control. In this case, the full signal band is used to control the gain of the first-marking amplifier. This control reduces strong signals along the time dimension and allows the weaker segments to be brought up into the marking range.

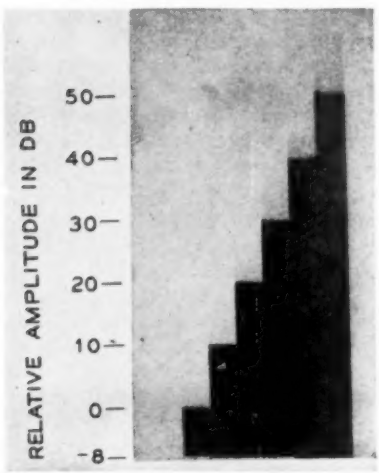

FIGURE 7. Typical sectioner amplitude calibration pattern.

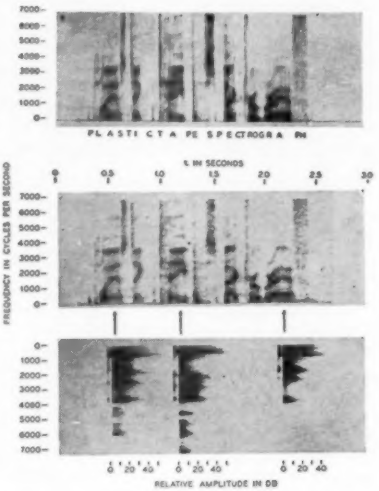

FIGURE 8. Analysis of the words, 'Plastic-Tape Spectrograph,' (top) wide-band analysis, (center) narrow-band analysis, (bottom) amplitude cross sections at points indicated.

The amplitude-sectioner circuit is essentially the same as that used in earlier spectrographs with the addition of a long-time integrating circuit. The conventional cross section gives a directly measurable portrayal of the relative amplitudes of the various frequencies present in the cross sectioned signal. The amplitude scale is usually adjusted so that a three-eighths inch increase in marking length is equivalent to a ten-decibel change in signal level. An example of a typical sectioner-calibration pattern is shown in Figure 7. The steps were made by feeding to the analyzer a steady tone whose amplitude was changed by 10-

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db steps at regular intervals of time. Typical wide-band and narrow-band spectrograms and cross section of speech are shown in Figure 8.

A circuit for integrating over times longer than 20 milliseconds has been included in the Plastic-Tape Spectrograph (*2*). One of the possible uses of such a system is to show (in the presence of noise) the existence of frequencies which are ordinarily masked by the noise.

Conclusions

The original version of the Plastic-Tape Spectrograph has been in operation for approximately two years and has proven easy to operate and quite dependable. One interesting feature of the Plastic-Tape Spectrograph is that speech samples can be recorded with other tape recorders at speeds other than 7.5 inches per second. The analysis is still made with the fast speed. When this is done, the upper-frequency limit of the analyzer becomes:

$$\frac{\text{recording speed in inches/second}}{7.5 \text{ inches/second}} \times 7000$$

In earlier spectrographs, the sound to be analyzed was recorded directly on a closed-loop medium. When a permanent record was desired, it was necessary to re-record the sound on another machine. If it was desired to analyze a sound from a reel of magnetic tape, a second machine was also needed to copy the sound onto the closed loop. The advantages of eliminating the re-recording process are lower signal distortion and operating convenience.

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Effects Of Duration And Articulation Changes On Intelligibility, Word Reception And Listener Preference*

Gilbert C. Tolhurst

In studies of the time patterns of speech, it has been found that differences in the duration of the phrase, word, syllable, or sound affect listener judgments (*6*, *9*). In a recent investigation (*2*), the time intervals between groupings of the items of a multiple-choice intelligibility test were progressively shortened to obtain a 'response readiness' test. One factor that emerged from an analysis of the data indicated that the somewhat dissimilar speaking rates habitually employed by the speakers yielded different intelligibility scores.

When a speaker is repeating material received aurally, it has been found that his rate, loudness, pitch, and dialect are affected by the patterns of the speech which he receives (*4*, *5*). Since little information has appeared concerning how the durational aspect of speaking affects speech reception, the first study (Part I) reported here was undertaken.

The second study (Part II) was made to determine whether precision of articulation is reflected by speakers relaying speech they hear. Separate studies were planned because of the apparent differences between the rate and articulation aspects of speech.

Part I.

Procedure. One male speaker recorded the 24 speaker lists of the multiple-choice intelligibility tests Forms A-1 and B-1 (*3*, *7*). Eight lists were read under each of the following conditions: (1) normal delivery; (2) prolonged delivery; and (3) staccato delivery.

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*In order to clarify the rather generalized terminology concerning articulation testing, we have found it convenient to make a differentiation between the terms 'intelligibility' and 'reception': Intelligibility is the criterion test score assigned to a *speaker* by a group of listeners; reception is the score acquired by a *listener* as he hears the stimuli from one of several speakers under the experimental provisions.

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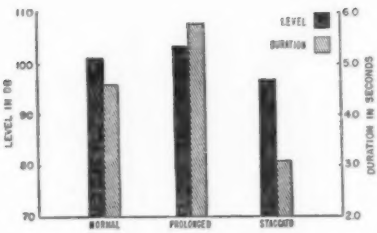

FIGURE 1. Mean sound pressure level in db and mean duration in seconds of the three variations of delivery as recorded by one voice. The speech unit was a carrier phrase (Number——) plus three words all spoken as a unit, without pause.

Figure 1 shows the sound-pressure level measurements, re 0.0002 dyne/cm², obtained from a power-level recorder (Sound Apparatus Co.) attached electrically across the earphones and then converted to sound-pressure levels by means of the earphone calibration curve. The second bar of each pair in Figure 1 represents the average duration of 64 'phrases.' Figure 1 indicates that there were relatively small differences in sound-pressure level between the three conditions, but confirms the presence of marked differences in duration.

The word lists were recorded by one speaker, in quiet, with an Altec 21-C microphone as the transducer. The output of the microphone fed an Ampex 400 magnetic tape recorder. The recorded lists were played back from the same recorder to headsets (PDR-3 earphones mounted in NAF-48490-1 earphone cushions) worn by 12 panels of listeners, 12-15 per panel. The listeners were seated in a sound-treated room with a sound-pressure level of 114 db of simulated aircraft noise (Harvard generator, Spectrum I) introduced ambiently into the room with listeners present. The speech signal measured at the earphones averaged 108 db (re 0.0002 dyne/cm²), yielding a S/N ratio of 0 to 2 db.

At the end of each experimental session, the listeners were asked to indicate which of the three methods of delivery they preferred.

Results. The word reception scores of individual listeners were determined and mean panel scores for each experimental condition were derived. The average panel scores obtained from Forms A-1 and B-1 were computed separately. In view of the lack of any statistical difference among listener responses between the two multiple-choice forms, the mean panel scores were pooled. A numerical ad-

TABLE 1. Summary of an analysis of variance to determine differences among the three duration conditions (prolonged, normal, and staccato) and between the two test forms (Forms A and B). The basic measures are mean panel multiple-choice word reception scores.

Source of Variation	*df*	*Sum of Squares*	*Variance*	*F*
Duration condition (C)	2	1195.33	597.67	229.00*
Test forms (T)	1	11.03	11.03	12.82
Panels (P)	11	1193.55	108.50	
C x T	2	3.26	1.63	1.55
C x P	22	57.49	2.61	
T x P	11	9.47	.86	
C x P x T	22	23.15	1.05	
Total	71	2493.28		

* Significant beyond the one per cent level of confidence (2 and 22 *df*).

vantage in intelligibility was obtained for the *prolonged* speech (86%) over the *normal* condition (84%); these scores are higher than for the *staccato* condition (77%).

Differences among the three conditions and between the two test forms with respect to reception scores were evaluated by means of a triple classification analysis of variance with panels as the random factor. A summary of the analysis is shown in Table 1. The analysis yielded an *F* ratio that indicates highly significant differences among the duration conditions.

A chi-square test was applied to the frequencies with which listeners expressed their preferences for *normal* versus *prolonged* delivery. The chi-square index of 2.02 (significant at the 12 per cent level of confidence) indicated no significant differences between listener preferences regarding these two modes of speaking. There was not a single preference expressed by any listener for the *staccato* condition, demonstrating that both the *normal* and *prolonged* speech were preferred over the *staccato* delivery.

Part II.

Two criterion measures were obtained concerning the degree to which speakers reflect the precision of articulation of verbal material they hear. The first was speaker intelligibility using a multiple-choice type test, and the second was a paired comparison judgment of samples of each talker's speech as he repeated the words he heard. The second measure was designed to determine how well relatively untrained listeners could detect differences of articulation.

Procedure. The 24 speaker lists of the multiple-choice intelligibility tests Forms C-1 and D-1 (*1*) were recorded by one trained talker simulating three conditions of articulation: (1) 16 lists with 'normal' articulation, (2) four with 'precise' articulation, and (3) four with 'slovenly' articulation. The 16 lists that were spoken normally were divided randomly into 12 normal control lists and four normal experimental lists. Each normal control list was paired with each experimental list, *i.e.*, precise, normal or slovenly. In making the stimuli for precise articulation, the speaker attempted to over-enunciate and still keep his rate, pitch, loudness level and dialect pattern natural. In making stimuli for slovenly articulation, the speaker chewed five sticks of chewing gum and used these as an obstruction to articulation while reading the test items, yet exercising care to keep the items understandable.

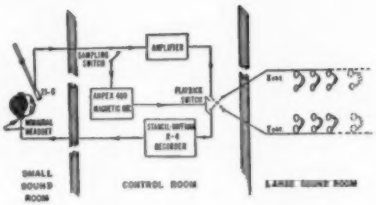

FIGURE 2. Block diagram of the speaker-listeners communications channel. The method of sampling of speaker test items with the switching arrangements for playback of the sampled item groups is also shown.

The equipment for making the stimulus recordings was the same as that used in the preparation of the experiment in Part I. The equipment used for presenting the stimuli to the panels of listeners and to the individuals who served as talkers is diagrammed in Figure 2.

The recorded stimuli upon playback were divided into two channels. One of the channels fed one-half of the headphones located in a sound-

treated room. One-half of each listening panel (12 listeners per panel for a total of 12 panels) listened and responded to the single-voice recording. The second playback channel was fed into a small sound-treated room; here a monaural headset was worn successively by one of four individuals per experimental session who acted as a speaker. Each speaker, as it came his turn to talk, was instructed that he would hear, via his headset, groupings of three words preceded by a carrier phrase. He was instructed to repeat the carrier phrases and the three-word groupings which he heard from the one-voiced stimulus recording. Care was taken *not* to suggest that the speaker imitate the manner of delivery.

The repetitions of the recorded stimulus words as spoken by each talker were picked up by an Altec Lansing 21-C condenser microphone placed five inches from his lips. The output of the talker's microphone activated a third channel which led to a separate headset circuit within the sound-treated room and provided the response items for the other one-half of each listening panel. The experimenter visually monitored the level of each speaker's voice and adjusted the output of the third channel (live voices) to match the average level of the first channel (recorded single voice).

After two of the four speakers had repeated the stimulus words, the channels were switched so that the listeners who had responded to the live voices for the first one-half of the experimental session now heard the single recorded voice for the remaining one-half. The listeners who had heard and responded to recorded single voice then heard the live repetitions of the remaining two talkers. There were a total of 12 replicated experimental sessions.

The ambient noise condition in the large sound-treated room with the listeners present was 32 db (C-scale, GR sound level meter). The signal level as measured by a probe tube technique under the listeners' headset cushion averaged 65 db re 0.0002 dyne/cm^2. The individuals comprising each listening panel were instructed on how to respond to the multiple-choice intelligibility test items.

A 'paired comparisons' recording was made of certain selected test word groups as they were repeated by the 48 individuals who served as talkers. As each speaker repeated the words he heard, two three-word groups from each of six multiple-choice test lists were recorded on tape. The word groups from the first three lists were selected randomly and separated on the tape by 10 seconds. After the selected word groups had been recorded from the first three lists, the tape was immediately rewound and a set of six three-word groups was randomly selected and recorded from the last three lists. These word groups were recorded in the 10 second intervals separating the first set. This procedure was followed in each experimental session, so that each speaker contributed a continuous series of 24 paired samples of three-word groups, corresponding to the articulation conditions of the original single-voiced stimulus recording. The word groups recorded were selected so that each *normal control* condition was paired twice with each of the three *experimental* conditions, *precise*, *normal* and *slovenly*.

After the listeners had responded to the multiple-choice intelligibility tests, they heard the paired-item recording and were asked to answer the following question for each of the paired samples: 'In your opinion, is the second of the pair of three-item word

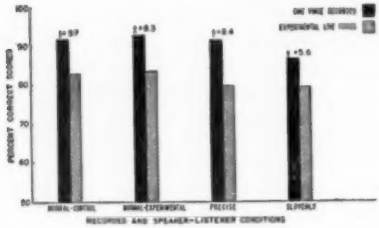

FIGURE 3. Mean listening panel scores resulting from each of the four articulation conditions. One-half of each panel heard one recorded voice and the other one-half heard four live voices. The live speakers received their stimulus words from hearing the recorded voice.

groupings *better than*, *equal to*, or *poorer than* the first three-item word grouping of the pair with respect to precision of articulation?'

Results. Average speaker intelligibility scores for each articulation condition per panel were determined for the 48 listener-speakers and for the listeners to the one-voiced stimulus recordings per articulation condition.

The mean speaker intelligibility scores for both the recorded stimulus voice and the 48 live voices are plotted in Figure 3. For each experimental condition, the single recorded stimulus voice was more intelligible than the average live voices; all differences were significant at the one per cent level of confidence.

Two analyses of variance were made, the first using the 48 individual speaker intelligibility scores as criterion measures and the second the intelligibility scores of the single-voiced recording, to evaluate the obtained differences among the articulation conditions. The first analysis indicated that the different degrees of articulation precision in the single-voiced stimulus recording affected the intelligibility of speakers who repeated the verbal material they heard. The obtained F ratio was 6.31, significant at the one per cent level of confidence (3 and 141 *df*). Both the two *normal* conditions (experimental and control) yielded higher numerical values, however, than did the condition of *precise* articulation.

The second analysis provided a test for the differences in intelligibility of the four articulation conditions of the one-voiced stimulus recording. The F ratio of 51.28 (3 and 141 *df*) indicated a highly significant difference in intelligibility scores for the three degrees of precision in articulation achieved by the single speaker. As in the 48 speaker comparison, the *normal* condition gave higher numerical values than did the *precise* or the *slovenly*.

The frequencies with which the second word grouping of a pair was judged *superior*, *equal*, or *inferior* in precision of articulation to the first were tabulated. A summative chi-square was calculated from the 12 panel-values (*8*), yielding a value of 56.29 (24 *df*), significant at the one per cent level of confidence. A pooled chi-square was significant at the five per cent level; but the interaction chi-square was also significant, indicating the judgments were not consistent from panel to panel.

Discussion and Conclusions

Generalizations derived from the data are subject to the limitations of the stimuli having been recorded by one voice (*2*). The single source, however, provided for a minimum of confounding with pitch and quality differences among voices.

A principal indication derived from

the first series of tests (Part I) is that staccato speech is relatively unintelligible and not preferred by listeners. The second set of experimental conditions (Part II) confirmed earlier findings that listeners tend to modify their resultant speech toward the precision of articulation they hear. The fact that this effect is measurable through intelligibility tests, sound-pressure level of the stimulus being held relatively constant, is noteworthy. Listener judgments of paired samples of the three-word intelligibility items generally followed the direction of articulation precision of the one-voice stimulus recording as these items were repeated by the 48 speakers.

Summary

The present study included two experimental procedures. The first treated the durational aspects of speech; the second treated articulation differences.

In the first procedure, Forms A-1 and B-1 of the multiple-choice intelligibility tests were recorded by a single voice. The test items were said in three manners: *normal*, *prolonged*, and *staccato*. Graphic tracings confirmed that the speaker achieved three degrees of rate with sound pressure level held constant. Word reception scores obtained in 114 db of noise were significantly different among the three conditions. The listeners were subsequently asked to state their listening preference among the three rates. The choices were equally divided between normal and prolonged.

In the second procedure, the same speaker recorded the items of Forms C-1 and D-1 with three degrees of precision of articulation: *precise*, *normal*, and *slovenly*. Experimental subjects heard and repeated the recorded three-word test items to panels of listeners. Other members of the same listening panels heard the original recording as a word reception test. Recordings were made of test items sampled from each speaker as he repeated the words of the original recording. These items were paired, *normal* and *experimental*. Listeners were asked to judge which item of a pair was better articulated. There were significant differences among the three conditions of articulation (1) as recorded, and (2) as repeated. Listeners detected differences in articulation between the paired items at a level significantly greater than chance.

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Intelligibility Of Whispering In A Tone Language

C. M. Wise

Lily Pao-Hu Chong

This is a report on the first of two experiments designed to determine the degree of intelligibility of whispering in a tone language. Mandarin Chinese, the native tongue of one of the authors, is the language used in the experiments.

The stimulus for the experiments was the observation that when spectrograms are made of an accurately repeated, whispered vowel, the formants appear to take relatively consistent positions, no matter how much the speaker tries to raise or lower the pitch of his utterances. The fundamental frequency of the voice is, of course, determined by the rate of vibration of the vocal cords, but the cords normally do not vibrate during whispering. Consequently, the formants characteristic of any given whispered vowel are merely the record of selectively chosen frequencies drawn from the complex of irregular vibrations produced by the friction of the breath stream passing through the stricture made by the partially closed glottis. So long as the whispered vowel is repeated with no variation of its quality as a vowel, the formants are likewise unvaryingly reproduced, notwithstanding any efforts of the whisperer to vary the fundamental pitch. Except for the selective potential of the supra-glottal cavities, there would presumably be no discrete formants—only a stripe of noise recordings. From these simple considerations it would seem that a tone language should be markedly less intelligible when the feature of tone or tonal pattern is eliminated.

Meyer-Eppler (*2*), after making spectrograms suggested to him by writings of Panconcelli-Calzia (*3*) and Giet (*1*), concluded: 'There are two substitutes for pitch movements which in voiced speech are used to indicate prosodic features. The whispered vowels [e], [i], and [o] substitute spectral noise for pitch, whereas [ɑ] and [u] possess some formants whose position changes with the intended "pitch."' Meyer-Eppler's spectrograms do, indeed, show the change of position of certain formants. It is possible that in the effort to change pitch, Meyer-Eppler's whisperer actually shifted the dimensions of his supra-

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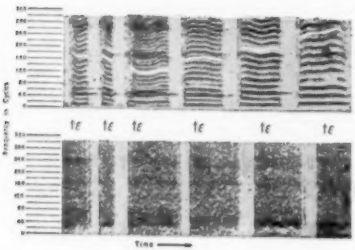

FIGURE 1. Spectrograms made by repetitions of the syllable [tɛ], sung to the tune of The Star-Spangled Banner. The spectrograms represent five utterances of [tɛ] instead of the words 'O say! Can you see?'

A. Expanded scale, narrow band analysis of the sequence as phonated.

B Expanded scale, narrow band analysis of the same sequence of syllables, uttered in an attempt to sing the same musical phrase in a whisper.

glottal cavities to those of a different allophone or a different vowel, whereupon the spectrograph recorded the characteristic features of the changed utterance. By contrast, in the spectrograms shown here, which record the vowel [ɛ], no such new features occur at the points where the whisperer was attempting to change pitch.

In Figure 1, *A* is a narrow band, expanded frequency, spectrographic analysis of the first few bars of The Star-Spangled Banner, sung aloud on the syllable [tɛ]. The rise and fall of the voice fundamental is reflected in the rise and fall of each of the partials. The tenth partial is traced in white for easier observation. *B* is a recording of the same material, with an attempt to sing it in a whisper on the syllable [tɛ]. As would be expected, there are no longer any discrete partials, and the positions of the formants on the frequency scale are essentially independent of the efforts of the speaker to vary the fundamental of his voice. Since the difference between the tones of a pair of otherwise identical-sounding words in Mandarin is a difference of pitch, the evidence in the spectrograms seemed to justify the postulate that such words actually could not be distinguished from each other if spoken in a whisper.

Certain teachers of Chinese, when questioned on this matter, stated that these words could indeed be distinguished. They testified that they had always been able to be understood while whispering, and they offered demonstration pronunciations. The demonstrations seemed inconclusive to a non-Chinese listener. There can be no doubt that the teachers had a minimum of difficulty in normal whispered conversation, where homonyms created by an inability to make proper distinctions among the four tones would occur but seldom and would usually be clarified by context. In the sentences of the experiment described below, the frequency of the appearance of homonyms was artifically increased.

At this point it is necessary to present a simplified statement of the nature of a tone language. Mandarin Chinese, *e.g.*, has four fundamental voice frequency or tonal patterns which are customarily called *tones*: (1) first tone, rather high-pitch, level; (2) second tone, rising; (3) third tone, falling-rising; (4) fourth tone, falling. As one of its identifying features, every Chinese word (except a few used neutrally) possesses one of these four tones as a supra-segmental phoneme. A child learns the tone of a word along with the vowel and consonant phonemes composing the word. He uses this tone thereafter with as little overt attention as if it were a

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vowel or consonant. That these tones are significant is demonstrated by the fact that many otherwise identical-sounding words are pronounced with two tones and resultantly have two meanings. Some otherwise identical-sounding words have three or four tones, with as many meanings. (This discussion avoids entering into the debatable question of whether Chinese is monosyllabic. For present purposes it will be so considered, since most Chinese words are monosyllables by any standards.)

The procedure of the experiment was simple. Thirty pairs of sentences were composed. The two sentences in each pair were identical in every respect, except that one pair of otherwise identical-sounding words differed in tone.[1]

The following is a typical pair of sentences. The last word in each sentence is the critical word.

Wo^3 yao^4 t'ang^1 [wɔ^3 jɑo^4 t'ɑŋ^1]
(I want soup)

Wo^3 yao^4 t'ang^2 [wɔ^3 jɑo^4 t'ɑŋ^2]
(I want candy)

These sentences were then cut on stencils and ten copies of each sentence were made on cards. To these 600 cards were added 30 cards representing copies of some 'trios' of sentences, and eight cards on which were written single (unpaired) sentences, bringing the total up to 638. These cards were then shuffled so that no two identical or nearly identical sentences were adjacent. Finally, the cards were numbered for later identification. The 638 sentences were recorded on tape; one of the authors (LPHC) spoke aloud the number of a card and then read the card in a whisper.

Six competent speakers of Mandarin were secured. These subjects were not given any explanation of the nature and purpose of the recorded material. Each listened to the playing of the tape. After each whispered sentence, each listener repeated aloud during the ensuing pause what she thought she had heard. Opposite the critical word on each card, LPHC wrote the number of the tone used by the listener. Below are the contents of a typical card, reading 'Wo^3 pao^4 le' (I have reported), with the notations of the tone of the critical word, 'pao^4,' upon it. It will be noted that the last person reported the tone correctly as the fourth tone; the other five reports were incorrect.

Wo^3
pao^4 /3/3/3/3/3/4
le

The process was repeated with each informant. In all, the whispered material was played and repeated aloud six times. This procedure yielded 3828 (6 x 638) utterances. Occasionally, LPHC's hearing of the critical word was uncertain and she made no record; hence, the total number of recorded utterances was 3824. A count indicated that the informants repeated the critical words with the correct tones 2391 times and with incorrect tones 1433 times, or 62% correct and 38% incorrect.

This experiment can be said to demonstrate that errors, and in very large numbers, are made in identifying whispered words in a tone language. It can, therefore, be said that a tone language is not consistently intelligible when whispered.

[1]The Chinese symbols for the two members of each of these pairs of words differed, naturally, but this fact had no relevance in the experiment, since the informants used did not see the sentences as written; they only heard them spoken.

Let us assume that there are four possible meanings for each critical word (as distinguished by the possible use of each of the four tones), and that each meaning fits equally well into the sentence framework. Under these circumstances, the subjects theoretically would be able to make correct identifications only 25% of the time. But not all of the meanings fit equally well into the established context. A given sentence might seem more familiar, or might make better sense with one or two of the tones than with the others. When presented with this sentence, the subject would reject the unlikely tones and choose a familiar one or one that made the best sense. It would then follow that the chances of a good score would be increased. Thus, the score of 62% correct becomes reasonable.

At present, as a check on this experiment No. 1, there is underway experiment No. 2, which is completely free from contextual aspects. The critical words alone, without sentence context, have been abstracted from the sentences used earlier and taped in a whisper. LPHC will present these words to informants, each of whom will repeat them aloud with whatever tones he thinks he hears. These tones will be recorded by number as before, and the percentage of correctness calculated. As a control for this experiment, the subject will be asked to listen to the words a second time, and to write them in Chinese characters as they are spoken aloud consecutively in the frame: 'You will write_____ next.'

Conclusions

Tone languages contain words which, if judged only by their strictly phonetic segments, appear to be homonyms. But they are not homonyms when spoken aloud, for they possess supra-segmental pitch phonemes by which meanings are distinguished. Examples: Mandarin 'hao^{3}' (good, well) and 'hao^{4}' (number, sign, day). The experiment reported in this article demonstrates that, when the pitch phonemes are withdrawn in whispering, the words do become homonyms and cannot be consistently distinguished from each other. Hence, a tone language is not invariably intelligible when whispered.

Summary

Thirty pairs of sentences from a tone language (Mandarin Chinese) were whispered to six competent speakers of the language. Each pair of sentences was identical except for two words which were phonemically distinguished on the basis of tone differences. The subjects were required to repeat aloud the sentences which they heard. It was found that the listeners were able to repeat 62% of the critical words with the correct tones.

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The Pitch Of Side-Tone

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The coupling between the speech mechanism and the ear is such that the talker experiences a unique version of his own speech. The talker and his listeners receive the signal through air both as direct and reflected sound. In addition, the talker receives a bone-tissue transmission of the sound. The airborne and the bone-conducted side-tones have been estimated by Békésy (*1*) to be approximately equal in magnitude at the cochlea of the speaker. Presumably the sound that is conducted via bone-tissue arrives at the cochlea before the airborne sound.

The foregoing circumstances probably contribute to the common experience that an individual's recorded voice does not sound to him like his real voice. The discrepancy is considered to be a qualitative one. However, there may be other aspects of side-tone error, including misappraisal of rate of utterance, pitch of voice, precision of articulation, and the sound pressure level of the voice. Fry (*2*) has observed: 'One of the effects of obliterating the feedback altogether, for example, is that the voice no longer functions properly and the subject can no longer sing in tune.'

The present study was planned to test the correctness with which a speaker hears the pitch of his voice. The study involved the matching of two aural stimuli: (1) a recorded stimulus that could be varied in frequency to match (2) a self-vocalized one. The former stimulus was recorded by the experimental subject on a variable-speed Model 400 Ampex recorder-reproducer. The subsequent vocalization at the moment of 'matching' was treated as a constant stimulus.

Procedure

Thirty-two males served as experimental subjects. Twenty-nine of them were trained musicians from the Cadet Choir and Station Band, Naval Air Station, Pensacola, Florida, and the

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TABLE 1. Analyses of variance: the effect of the original displacement of the variable stimulus *high* and *low*, and of the responses occurring in a *dead* and *live* environment. Basic measures: coded from discrepancies between 'constant' stimulus and matched variable stimulus in cps.

Source of Variation	*d.f.*	*Mean Square*			
		75 db	*85 db*	*95 db*	*105 db*
High-low settings (hl)	1	28.90	25.88	13.83	36.78
Dead-live environment (dl)	1	90.35	6.67	33.37	29.13
Interaction (hl x dl)	1	373.80	10.33	35.58	6.67
Remainder	28	408.52	15.32	39.46	51.58

remaining three were professional workers in speech. All of the subjects were experienced in making judgments relative to vocal pitch. The participants were highly motivated, taking the experimental task as a challenge to their musical capabilities.

In the experimental sessions, the subject was seated in a sound-treated room and asked to sustain the vowel [ɑ] at each of four levels as indicated on a VU meter within his view. These were equivalent to 75, 85, 95, and 105 db at the ear canal, the levels at which the stimuli from the variable system were subsequently presented to him. (A vocal level lower than 75 db could not be reliably sustained; the upper limit could be achieved by all of the subjects.) A condenser microphone unit, suspended from a headband and positioned at the corner of the speaker's mouth, fed the recording system and the visual monitoring unit.

A 10-second sample of the sustained vowel was recorded on the multichannel Ampex (the reference system) and on a 15-second loop of tape on the variable-speed Model 400 Ampex (the variable system). The reproduction of the vowel on the latter system was variable in frequency through adjusting the frequency of the voltage supply to the motor. The vowel was played back repeatedly to the subject with five seconds between successive reproductions after the experimenter had varied the frequency. An uncoupled monaural receiver, offset by blocks of sponge rubber, fed the variable stimulus to the experimental subject. The subject was given practice in controlling the voltage regulator and was asked to restore the pitch of the variable vowel stimulus to the pitch of the original vowel. He was told to attempt to revocalize the original vowel as much as he wished, maintaining the sound pressure level of the original vowel by watching the VU meter. He was asked to acquaint himself with the time sequence of the recording and to start vocalizing prior to the break in the record and to continue throughout the onset of the next replaying of the variable stimulus. His revocalizations were considered the constant stimuli.[1] When the subject signaled that he had matched the vowel on the variable system with his own revocalization of it, both his utterance at the moment and the variable signal were recorded.

[1]The foregoing procedures exploited the experiences of Malloy in a comparison study (3) in which she did not use musicians as experimental subjects, relied upon the mechanical adjustment of turntable speed for adjustments of frequency, and included a stimulus signal of 65 db.

TABLE 2. Mean fundamental frequencies (cps) of vocalizations of the vowel (a) ('constant stimuli) and of similar recorded vowels (variable stimuli) that were judged by speakers to be matched to the vocalizations, and values of t. $N = 32$ subjects.

	*Mean Fundamental Frequency of Sustained Vocalization** (*cps*)	*Increment* (*semitones*)	*Mean Frequency of the Matched Variable Stimulus* (*cps*)	t
75 db	133.15		135.66	1.54
85 db	152.86	0.72	153.66	1.63
95 db	160.87	0.26	162.97	2.14
105 db	211.10	1.42	212.56	1.52

*The mean values of the original vocalizations were 133.2, 151.7, 160.5, and 209.0 cps, respectively.

The order in which the four sound pressure levels were employed as variable stimuli followed a rotational plan. Alternate stimuli were distorted higher and lower in pitch prior to the matching task. Although the experimental procedures occurred in a sound-treated room, one-half of the subjects performed in the presence of an acoustic reflector that stimulated some of the characteristics of a live room. Each subject was given as long as he wished to complete each of the four parts of the experimental task. The modal time per subject exceeded 30 minutes.

The fundamental frequency of the recorded vowels was measured on a Stroboconn. To facilitate measurement, a variable low-pass filter preceded the Stroboconn. The measurement of each recording was made three times. The readings from the Stroboconn were made by one experienced observer. To test the consistency with which he could make the readings, 20 vowels were recorded and presented to him via the Stroboconn in a random order on each of five days. The rms variation of his measurements for the 20 vowels ranged from 0.012 to 0.359 cps with a median of 0.024 cps.

Results

Analyses of variance, summarized in Table 1, indicated that the magnitude of the error in adjusting the variable stimulus was affected by neither the direction of the original distortion of the signal (high-low), nor the dead-live condition.

The principal comparison involved t-tests (correlated measures) between the fundamental frequency of the selected variable vowel stimulus and of the vowel that was being sustained at the time the subject signaled 'matched.' The mean frequencies of these conditions appear in Table 2. In each instance, the mean frequency of the variable vowel stimulus was numerically higher than was the mean frequency of the constant vowel stimulus. The values of t between the pairs of values (cps) enumerated in the rows of Table 2 were respectively 1.54, 1.63, 2.14, and 1.52. With 31 degrees of freedom, values of t associated with the 20, 10, 5, and 2 per cent levels of confidence are 1.28, 1.64, 1.96, and 2.33. One comparison, 2.14, exceeded the 5% level of confidence. Obviously the magnitude of the discrepancy under test was small. The median error at each level was 1.9

TABLE 3. Number of subjects who made low, correct, and high settings at each of four sound pressure levels.

	Low	*Correct*	*High*
75 db	10	5	17
85 db	10	4	18
95 db	7	7	18
105 db	10	7	15

cps, 1.5 cps, 1.8 cps, and 1.0 cps, respectively.

If pairs of variable and 'constant' values that did not differ by more than 0.5 cps are considered as correct matches, the number of subjects who set the variable stimulus *low*, *correct*, and *high* are shown in Table 3.

If the correct response is defined as ±1.0 cps, the low and high judgments at the four levels were 8 and 14, 6 and 15, 5 and 15, and 6 and 12, respectively. No subject set the variable stimulus *low* at more than two levels. The median discrepancy between the constant stimulus and the original vowel was less than 2 cps at each of the three lower sound pressure levels and less than 3 cps at a level of 105 db.[2]

Discussion

The question under test was whether or not the pitch of side-tone agrees with the pitch of an external stimulus of similar character. The results are inconclusive. Four sets of results deviated from *zero disagreement* in the same direction; yet only one was significant at the 5% level of confidence. The average magnitude of the discrepancy is of the order of 1 to 2½ cps.

One might conclude from a solely statistical basis that the null hypothesis is rejected in one instance at the 5% level of confidence and that the less conclusive outcomes at the three other vocal levels either (a) indicate that the ability to judge the pitch of side-tone is a function of signal level or (b) challenge the experimental procedures.

[2]In the comparison study, the comparable errors at the 75 db and 85 db levels were 0.9 cps and 5.7 cps.

Summary

Thirty-two experimental subjects recorded vowels at four specified levels of sound pressure. The vowels were played back to the subjects at distorted pitches. The subjects attempted to correct the pitches of the vowels by altering the speed of the playback mechanism and by matching the pitches to those of subsequent revocalizations of the same vowels. The mean discrepancy between the two sets of frequencies was statistically significant in one of four comparisons, *i.e.*, four levels of sound pressure of the vowels.

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Cerebral Palsied Monovular Twins

Marit Skatvedt

D. E. Morley

Strandskov (*8*), who analyzed 28,000 births that took place in the United States from 1922 to 1936, has reported that twins are born in 1.61 per cent of all pregnancies, or about once in every 89 pregnancies. The *Norges Offisielle Statistikk* for 1950 (*9*) reported that the incidence of this type of multiple birth was 1.4 per cent in Norway.

The most frequent types of twins are of two varieties, identical (monovular) and non-identical (binovular, or fraternal) twins (*4*). Identical twins come from a single ovum fertilized by a single sperm. Non-identical twins occur when two ova are fertilized simultaneously. Identical twins resemble one another in their hereditary traits, whereas non-identical twins are no more closely related than other siblings. Approximately one-fourth of all twins are of the monovular (identical) type. Hence, of all births, only about .4 per cent can be expected to be identical twins.

The relative incidence of central nervous system malformations in identical twins is not known. Record and McKeown (*6*), on the basis of their data on 69 pairs of twins showing congenital malformations of the nervous system, estimated an incidence of .14 per cent per 1000 total births. They had no direct evidence of the number of monovular twins among those pairs, but survey of the literature revealed that both twins were affected in some monovular pairs. Josephson and Waller (*3*) reported identical twins with anencephalus in 1933 and de Lange (*1*) described hydrocephalus in monovular twins in 1936. In 1941, Eskelund and Bartels (*2*) noted spina bifida in such twins. Quisenberry, in 1944 (*5*), described spina bifida and meningocele. Reviewing a total of 301 cases of cerebral palsy, Yue (*11*) reported one set of monovular twins. In 1952, Thomsen (*10*) reported congenital cerebellar ataxia in identical twins in Denmark. Such reports are not numerous.

From 1950 to 1955, 370 cerebral palsied children were examined at Rikshospitalet (University Hospital), Oslo. Results of the examinations are reported by Skatvedt (7). These children had been referred from communities throughout Norway and represented a sizeable, unselected sample of such cases. Twenty-five sets of twins were found, with only *one* set

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of monovular twins. They were examined and judged to be identical at the hospital where they were born. Considering the infrequent incidence of such cases where monovular twins show malformations of the central nervous system and survive, when they *are* discovered they are interesting subjects for clinical study. It is the purpose of this article to describe this pair (Erna and Margot, born June 6, 1946, in Norway) by reporting the results of a variety of examinations. This article should be regarded as a case report.

History

The family history of this monovular pair showed no other cases of cerebral palsy, epilepsy, or any other type of nervous disease. The parents were physically sound and were not related prior to marriage. There were three normal siblings, one younger and two older than the cerebral palsied twins.

During the pregnancy, the mother reported feeling 'unwell,' but she had no specific illnesses. The twins were born in a hospital, 10 weeks prematurely. Delivery was normal. The birth weight of each child was approximately 1000 grams. Both were cyanotic. Crying was delayed. There was no jaundice. The children were breast fed for three weeks. When they were brought home from the hospital after three weeks, the mother discovered that the legs of each infant were stiff and there were not the usual kicking movements which she had observed in her previous children. At six months they kept their legs crossed when in the supine position. At two years they were still unable to sit without support. They had begun to say words at approximately two years of age. These children were first seen at Rikshospitalet, Oslo, in January, 1951. They were then 4½ years old.

Examinations

A routine neurological examination showed each of the pair to be spastic quadriplegic. Twin number one (Erna) had more severe involvement than her sister (Margot). Otherwise their cases were analagous.

An electromyographic examination of legs and arms showed that in each of the pair there was an increase in electrical activity during both active and passive movements. The action potentials were normal with the usual interference spikes resulting from more vigorous movements.

A pneumoencephalographic examination was made. In twin number one (Erna), both lateral ventricles and third ventricle were dilated (larger than normal), as were the basal cisterns. The sulci showed no abnormalities. Similarly, in twin number two (Margot), lateral and third ventricles and basal cisterns were dilated and the sulci showed no abnormalities. However, there was a septum pellucidum cyst.

A normal electroencephalogram was obtained on each of the pair in December, 1956.

Psychometric testing was done twice. In April, 1951, the response of twin number one (Erna) to the testing situation was not good. She was apprehensive and cooperated poorly. Hence, a specific I. Q. score was not given, but the examiner's gross estimate of her developmental age was four years. Erna was four years, ten months old at the time. Twin number two (Margot) obtained an I. Q. score

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of 114. The Terman-Merrill Scale, Form L, was used.

The second testing was done in 1954, using the Chicago Test of Primary Mental Abilities and the Columbia Test. In the various aspects of mental growth (verbal usage and verbal comprehension, perceptual ability, logical reasoning, and spatial relationships), the second twin showed abilities superior to her sister. The examiner predicted slow progress in learning by Erna and average achievement for her sister. Reports from their teacher concerning recent academic progress have borne out this prediction.

Tests of motor ability were made in February, 1956. For the upper extremities, activities involving grasp and release, writing, eating, blowing, dressing, and toileting were evaluated. Erna was judged to be able to manage all the activities satisfactorily except eating with knife and fork and hair combing. Margot performed well except for minor dressing activities. Both girls were judged to be only slightly handicapped in the use of their upper extremities.

Lower extremities were evaluated in regard to movements from a prone position, rolling, sitting, crawling, kneeling, standing, and walking. With the exception of dorsiflexion of the feet, active movements of the lower extremities were very limited in Erna. Similarly, movements from a prone position were negligible except for head raising and back arching. Rolling was accomplished adequately, as were sitting, crawling, and kneeling. Standing and walking were virtually impossible without support.

In Margot's case, with the exception of leg lifting with knee straightened and dorsiflexion of the feet, the movements of the lower extremities were accomplished either independently or with assistance. This was in contrast to Erna's results. Erna showed very little ability on this part of the testing of the lower extremities. Similarly, Margot's movements in the prone position generally were better than Erna's. As was true in Erna's case, rolling, sitting, crawling, and kneeling were judged to be satisfactory. Finally, in marked contrast to Erna, Margot was able to stand and to rise from a chair and to walk with canes. She could not climb stairs.

Tests of sidedness were made in November, 1956. Several of the conventional tests were used: simultaneous writing with both hands while blindfolded, ball throwing, hand rotation, and tapping. Eyedness was determined by their looking at the examiner through a hole in a piece of cardboard which was held at arm's length. The eye seen to be directly behind the hole was judged to be dominant. Footedness was estimated by having the girls supported with their backs against a wall and asking each to 'walk' toward the examiner. The leading foot was observed in each case.

With the exception of eyedness, there was a marked indication of specific sidedness in this twin pair. Of special interest was the clear-cut mirroring of one to the other. Erna's responses were definitely left-sided. Margot showed right-sidedness. As to eyedness, Erna showed right-eyedness in contrast to left-sidedness on all other tests. This inconsistency may be explained by the fact that she was found to have hyperopia and amblyopia in the left eye and consequently may be using the right eye as a matter of expediency. Margot, likewise, showed inconsistency in eyedness. She indicated left-eyedness whereas all

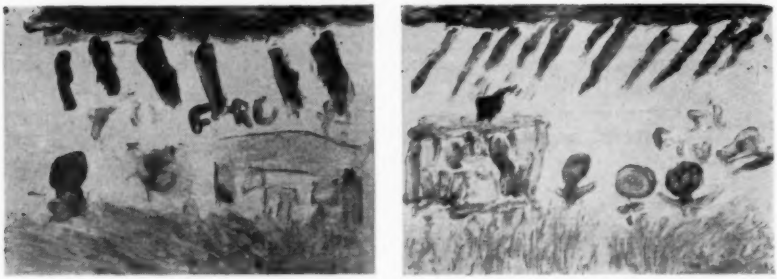

FIGURE 1. Drawings by monovular twins showing mirroring of sidedness. Erna's (left-sided) is at the left. Margot's (right-sided) is at the right.

other activities showed her to be right-sided. A test of her vision made in December, 1956, in the ophthalmology department at Rikshospitalet, showed fixation mostly with her right eye and only occasionally with the left. Her vision was found to be: right eye plus 1, 5/5; left eye minus 1, 5/5, and five degree strabismus divergens (deviation of the eye in which the visual axis of the squinting eye falls below the fixation point).

Distinct sidedness preference is shown in the pictures drawn by the twins (Figure 1). Erna's (left-sided) is at the left. Margot's (right-sided) is at the right. Each had been asked to draw a scene of a house and flowers in a rain storm. The heavy lines representing rain in Erna's picture start at the left and slant downward to the right. In contrast, Margot's lines begin at the right and go to the left. It will be noticed that the house and flowers are at opposite sides of the pictures.

In all probability, the mirroring observed in these twins in various aspects of sidedness should not be considered as a concomitant of the brain damage but as a natural sidedness phenomenon characteristic of this pair of monovular twins. Such mirroring has been observed in twins who were not cerebral palsied.

Oral motor performance and speech were examined in November, 1956. Although the speech of each of these girls is satisfactory for most oral communication purposes, tests of oral motor performance and a phonetic analysis of the speech of each child were included in the total evaluation. Accuracy and adeptness of movements of oral musculatures were tested by having each of the twins perform lingual and labial maneuvers and by estimating oral diadochokinesis by the use of the 'pa-ta-ka' series. The rate and accuracy of performance of the utterance of the series when spoken as quickly as possible by each subject was compared with the rate which can be expected in non-cerebral palsied children. An evaluation of the articulation of speech sounds was accomplished by having each twin repeat speech sounds after the examiner, repeat words, and finally by saying the verses of the Norwegian national anthem.

Erna demonstrated an oral motor performance which was most apt to be accurate at a slow rate. Oral diadochokinesis tended to be slow and somewhat arhythmic. The analysis of her production of speech sounds showed her able to produce them adequately, and the intelligibility of the

speech was acceptable if the rate was kept slow enough to permit accuracy of placement and movement of oral parts in articulation.

Margot's oral motor performance, although slow, was noticeably more rhythmical. The production of speech was slow but clear.

It is of interest to note that the degree of difference between the two generally is unfavorable to Erna, the left-sided twin. It is she who does less well on the psychometric evaluation. Her school achievement has been lower. She has greater involvement of the lower extremities. Her performance on oral motor activities was somewhat less satisfactory than that of her right-sided sister.

Summary and Conclusions

Cerebral palsy in monovular twins has been reported. The family history of this pair appears to be essentially normal and heredity seems to be noncontributory. The similarity of involvement of each of the twins as shown by the neurological examination, pneumoencephalograms and electromyographic examination might point to a developmental defect rather than some adventitious factor as the etiological agent. The cerebral palsy involvement is similar in each child, differing only in degree. However, the marked prematurity with extremely low birth weight cannot be overlooked as a cause of their cerebral palsy. Furthermore, the birth history records cyanosis. Recent electroencephalographic examination shows essentially normal patterns for each girl.

Such twins are not common. Since twins are born in approximately 1.5 per cent of all pregnancies, about .4 per cent of the total births being monovular twins, Record and McKeown's estimate that congenital malformations of the nervous system in twins will occur in .14 per cent of cases makes the probability that one will find twins who are monovular *and* cerebral palsied extremely small. In addition to their being uncommon, these girls are of interest because they show a rather complex variety of symptoms which may be due in part to their cerebral palsy and in part to the fact that they happen to be mirroring twins.

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Bibliography of Publications on Speech and Hearing in Cerebral Palsy

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This bibliography is the result of a survey of published materials from 1933 to 1956. Although it is not exhaustive, it should serve as a comprehensive reference guide to the student and specialist interested in the communication of the cerebral palsied. The survey was confined to publications in the English language and does not include unpublished materials such as theses, *etc.* Published abstracts of unpublished materials have been included.

The articles and pamphlets are classified into the categories of speech problems, hearing problems, breathing problems, and habilitation procedures. An additional section has been included for articles dealing with problems of professional preparation in speech and hearing and the relationship of this field to other professions. Books and special chapters from books which deal mainly with speech and hearing in cerebral palsy are also listed under a separate category.

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Babbling And Echolalia In Language Theory

Helmer R. Myklebust

Speech pathologists, psychologists, audiologists and neurologists have given considerable attention to the phenomena of babbling and echolalia. Study of these functions has been fruitful for theories of language development and for diagnosis and therapy. Each of these phenomena is intriguing and challenging, although complex and difficult to comprehend. Nevertheless, as research and clinical study progress, there is an increasing awareness of the significance of these functions. Apparently they are manifestations of critical processes in the total complex of factors involved in language development and language behavior.

For purposes of this discussion, babbling is defined as the pleasurable use of vocalization by the child in the pre-verbal period. As this definition implies, neither the very early use of reflexive vocalization nor utilitarian vocalization (vocalizations such as the infant uses for calling attention to himself) by the infant is included. There seems to be little reason to believe that reflexive use of vocalizations has an important relationship to speech or language development. Screaming from fear or rage, as well as the vocalizations associated with feeding and other similar processes, are found in lower animals and in children who do not develop speech. Reflexive vocalization is useful in the study of infant behavior, but it is helpful to view babbling in a more specific sense as it pertains to speech and language development (*3*).

Mowrer (*5*) suggests that the infant babbles mainly when he is contented and when he is not in the presence of the parent. Usually this is after feeding and after being placed in his crib. He then engages in babbling, apparently for self-gratification purposes only. Mowrer views this behavior as a means by which the infant can relate to and recall his mother. This concept is useful in terms of language theory. It is apparent that to learn language the child not only must have integrity of the peripheral and central nervous systems but also must have adequate integrity of psychological processes (7).

Relationship between language development and psychological processes. The first basic psychological process that must be intact is that of *identification.* The infant must feel that he wants to be like the *talking* human being if he is to learn the complex system of symbols referred to as

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language. The population of nontalking children includes those who seem not to have been able to achieve such feelings of identification.

From the point of view of language theory, babbling is the first manifestation of identification. Furthermore, it is the first specifically *human* act. The peak of babbling for the average child seems to fall between five and seven months of age. The behavior of the human infant prior to four or five months is not widely different from that of various other mammalian forms of life. With the onset of babbling, the behavior of the human becomes characteristic and essentially unique. This is further emphasized by the fact that the human infant is the only form of life which engages in babbling.

The second psychological process which must be functioning adequately for language to develop in a normal manner is that of *internalization*. Language development in general consists of acquiring symbols to represent experience. As experience is gained, symbols are needed and are acquired for the purpose of representation and communication of that experience. This process of relating *symbol* and *experience* in referred to as internalization. Presumably internalization cannot proceed successfully unless the basic step of identification has been achieved. As maturation progresses and babbling gives way to the early verbal period, the infant increasingly internalizes his environment through symbolization.

There is no dichotomy between the period of identification and the period of internalization; these processes overlap and proceed simultaneously. However, it seems that the process of identification is paramount in earliest life, up to and including the babbling period which for the average child seems to be until about eight months of age. From eight to twelve months, the period when the child first begins to comprehend the spoken word, the process of internalization seems to be predominant. Presumably, this process goes on throughout the life span of the individual. Nevertheless, in order to study the genetics of language development, it is necessary to ascertain its beginning and its relationship to the acquisition of verbal behavior. This is relevant to language theory, diagnosis and therapy (*8*). A common circumstance encountered in children who are not developing language normally is the child who makes satisfactory progress until eighteen to twenty-four months of age, at which time he ceases talking. In some cases this can be explained on the basis that the child found language threatening and punishing to the extent that internalization was impeded or precluded (7).

As identification and internalization progress, there is increasing need for relating one experience to another; that is, the need for *assimilation*. Assimilation is the third psychological process required for language development. It is symbolization and assimilation that make abstraction possible. As the child acquires more and more language, he must relate all experience as meaningfully as possible. In the normal child, this process of assimilation seems to be related to and enhanced by *echolalic behavior*. The normal child engages in echolalia mainly between two and four years of age, with the peak occurring at approximately three to three-and-one-half years. Observation indicates that he engages in echolalia usually at times when the language he is hearing is difficult for him to comprehend, *i.e.*,

to assimilate the meaning with his prior linguistic experience. Echolalia is useful and helpful when repetition of what the child hears fosters a relationship of experience and thus increases generalization and abstraction. This process is referred to as assimilation.

This point of view emphasizes the relationship between language development and certain psychological processes and indicates that genetic maturational levels are involved; identification must precede internalization and internalization must precede assimilation. Likewise, babbling must precede the acquisition of verbal meaning and a basic verbal level is necessary before echolalia can occur and fulfill its integrative role. Furthermore, there are reciprocal relationships between these factors; that is, as internalization develops it fosters further identification, and as assimilation develops it fosters further internalization. The same is true in the process of language development. Although babbling ceases, having served its purpose, the more mature processes of symbolization and echolalia enhance each other reciprocally. As Miller (*4*) suggests, echolalia continues throughout the life span. The adult frequently repeats a difficult word or sentence in order to assimilate its meaning and thereby to respond appropriately.

Babbling and language disorders. If babbling and certain psychological processes are related, it would be expected that some children would not babble. On the basis of this frame of reference, a child who is severely rejected in early life might not identify with his parents and therefore not babble. Experience suggests that this occurs only infrequently and only under certain circumstances of severe rejection. Mowrer (*5*) and Munn (*6*) have suggested that the hearing impaired child might provide more conclusive evidence. (Based on a statement from a teacher, Mowrer assumes that deaf children do not babble. Munn uses the same evidence by quoting Mowrer.) The fact is that scientific evidence for the lack of babbling in deaf children is difficult to secure. Babbling as a descriptive term has been used so broadly and has been so variously defined that almost any statement might be relevant. Evidence for lack of babbling in any child usually is secured through the history from the parent. This assumes careful definition and precise questioning on the part of the interviewer. The definition suggested in this discussion has been used with several hundred parents of hearing impaired children. The typical response was that the child used vocalizations early (six to seven months) to call attention to himself but that he did not babble. The child used vocalizations for utilitarian but not for pleasurable purposes. It seems unlikely that the hearing impaired child babbles, as here defined, since he cannot hear and enjoy his own vocalizations. By implication his identification must occur essentially on a visual-tactual basis.

Another child who seems not to babble is the receptive aphasic. Perhaps this is not without exception, as the degree and type of involvement can be assumed to be important variables. Nevertheless, congenital receptive aphasia frequently seems to preclude normal development of psychological processes, such as identification. Without identification, babbling seems not to occur. Presumably this is because damage to the brain precludes or impedes development of concomitant psychological develop-

ment. There is also the possibility that the receptive aphasia impedes association of meaning to the vocalization of others and thus pleasurable use of them is without benefit to the organism. The manner in which babbling behavior develops and varies remains to be studied further with most groups of handicapped children, including the deaf, aphasic, blind, cerebral palsied and mentally retarded.

Echolalia and language disorders. Echolalia presents an unusually challenging problem in language disorders in children. It is a commonly encountered condition. It varies from extreme manifestation to subtle, almost imperceptible repetition of only the final syllable of a word or a sentence. Echolalia has been described as a symptom in infantile autism and childhood schizophrenia. Such echolalia might be a manifestation of the generalized impairment of the emotional structure of the personality, including identification, internalization and assimilation. The echolalic behavior might be stereotyped attempts to assimilate experience successfully. However, the syndrome considered here is one found in children presenting behavioral and other evidences of brain damage.

Some brain-damaged children are highly echolalic. Moreover, experience suggests that these children often present a pattern or syndrome of unusual auditory disturbance and behavior. Frequently they perseverate auditorially in a number of ways. They might insist on having a certain sound for an indefinite period. If the sound is taken from them, they become disintegrated and approach catastrophic behavior. In some instances they repeat tunes or commercials heard on television with unusual accuracy and with phenomenal manifestations of memory, but without meaning. In one instance both parents were professional musicians and noted that their four-year-old son had absolute pitch. He was also echolalic, perseverated auditorially and otherwise manifested disturbance and peculiarity of auditory behavior.

On the basis of the genetics of language development, these children have found it possible to achieve identification, they have acquired some words meaningfully and they have accomplished some internalization. However, because of brain damage, they cannot assimilate experience meaningfully. Usually with effort and delay they reach but cannot master the level of assimilation. This suggests that their echolalia is the organism's attempt, through persistence, to achieve adequate integration of experience for the maintenance of a satisfactory homeostatic relationship with their environment.

This echolalic phenomenon might be described also in terms of language function. Language serves three main purposes: for thought, for understanding others and for expressing ideas to others. These three aspects of language can be referred to as inner language, receptive language and expressive language. Genetically, inner language develops first (during first eight months of life), receptive language second (from eight to twelve months), and expressive language third (about twelve months of age). This means that the child does not speak until he first acquires some ability to symbolize inner experience and until he can first comprehend some of what is said to him. Language, to be meaningful, must first be meaningful to the individual himself. Receptive and expressive language are possible only when they relate to

inner language. The echolalic child manifests this principle. He can receive the spoken word and speak but it has no meaning to him. Consequently, echolalia can be considered as a form of aphasia, a type of symbolic language disorder.

The echolalic child is unable to relate symbol and experience although he can receive and repeat the symbol satisfactorily. This means that echolalia is not characteristic of either receptive or expressive aphasia. Rather, it is characteristic of a deficiency in inner language functioning and, therefore, it is best referred to as a form of central aphasia. This seemingly is in agreement with the discussion of Goldstein (*2*), who states that the temporal lobes are important in the occurrence of central aphasia. In view of the clinical indication that echolalic children frequently have other auditory disorders such as auditory perservation, it is likely that the temporal lobes are involved. Goldstein suggests further that echolalia is a breakdown of the associations between the language and non-language mental performances with the possibility that there is involvement of the frontal lobes. Another possibility is that echolalia is a result of partial and ineffective transfer of function from the dominant to the non-dominant hemisphere. Cobb (*1*) indicates that destruction of association pathways is significant. Presumably, this means that the association pathways are defective from the temporal lobe to those areas which make the development of inner language and symbolization possible.

Whether the classification of echolalia as a type of central aphasia is scientifically the most accurate and desirable remains to be determined. However, that it presents a challenge in terms of language theory and a problem in terms of language disorder is apparent.

Summary. Babbling occurs as a concomitant to the psychological process of identification. It also manifests the beginning of internalization. As babbling gives way to imitation and as identification and internalization progress, echolalia and assimilation predominate in normal language development. Deaf children and certain receptive aphasics apparently do not babble. In brain-damaged children, echolalia may be an indication of an inner language disorder and, therefore, might be classified as a central aphasia.

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Speech Of Children Before And After Removal Of Tonsils And Adenoids

Margaret C. L. Greene

A speech survey of a consecutive series of unselected cases of children for whom removal of tonsils and adenoids, or of adenoids only, was necessary was conducted over a period of 18 months. All children were examined by an ear, nose and throat surgeon and a speech therapist before surgery; a selected number were also examined after surgery.

One object of the survey was to discover whether articulation was affected by the removal of tonsils. It was hoped to ascertain whether a speech therapist is ever justified in advocating tonsillectomy for children with enlarged tonsils and defective articulation. Another object was to discover the number of children who developed nasal speech after removal of tonsils and adenoids and, if possible, the cause of the nasal speech in such cases. The literature upon the subject does not distinguish clearly between the effects of tonsillectomy and adenoidectomy upon speech; the term tonsillectomy is used indiscriminately in most instances to describe both tonsillectomy and adenoidectomy.

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Procedure

Each child was examined before operation with regard to articulation, nasal resonance, and vocal quality. Note was also made of the relationship of the jaws, tongue posture, height and width of the hard palate, elevation of the soft palate in the articulation of [a:], and the size of the tonsils. A test for nasal escape of air was made by holding a cold mirror beneath the nostrils during the utterance of vowels and a phrase devoid of nasal consonants. If nasal escape of air was present, ability to blow out a toy carnival blower was tested. Hearing was also checked in the medical case history and by means of audiograms; reports of variable hearing given by the mothers were noted. An over-all picture of each child was obtained by questioning the parents with regard to the children's emotional stability, appetite, sleeping habits, and school progress both before and after operation.

A total of 377 children between the ages of three and 8 years were included in the survey. It was originally intended to examine every child after operation, but in a country district presenting transportation difficulties it was found that parents of children with normal speech would not cooperate in a speech examination after operation. Therefore, only those chil-

dren whose speech or behavior warranted a further examination, and those whose speech was reported to be nasal after operation by medical or nursing staff or parents were examined again. A total of 158 children were reviewed. No abnormalities of speech or behavior were noted or reported for the remaining 219 children, either before or after operation.

Adenoids were removed by curettage, and tonsils by scissor dissection and snare (*1*). When it was necessary to remove infected tonsils, adenoids were removed at the same time as an invariable rule in order to avoid the possible necessity of adenoidectomy at a later date. Adenoids only were removed when tonsils were found to be healthy. Out of the 377 children in the survey, 347 (92.1%) underwent tonsillectomy and adenoidectomy and 30 (7.9%) underwent adenoidectomy.

Findings

Articulation. An abnormal tongue posture at rest, with the tongue tip resting between parted teeth (*6*), was present in 21 (5.6%) of the children in the whole group. The bite and relationship of the jaws was normal in eight of these cases, seven were prognathic, and six had an open bite. In this group of 21 children, it was found that eight spoke with interdental articulation for alveolar consonants, but managed to produce an acoustically acceptable result. One child was dyslalic and of dull intelligence. Tongue posture remained unaltered by tonsillectomy and adenoidectomy but articulation was no longer interdental in two cases. A high and narrow hard palate was present in six cases but resonance was normal. These findings did not confirm, therefore, the commonly held belief that a high vaulted hard palate contributes to nasality of tone (*14*).

Lisping was noted in 11 children over the age of six years in the total group of 377. Indistinct and slurred speech was present in 25 children; tongue movement in these cases appeared to be restricted by large tonsils which in many cases met at the midline; muscle tonicity was also adversely affected. Insufficient nasal resonance was a conspicuous feature in the indistinct speech of these children; the voice also had a typical throaty quality and inadequate projection described by Makuen (*9*). Parents and teachers complained of difficulty in understanding these children. It was a common complaint of the parents that speech had been clear at two or three years of age but had progressively deteriorated with the development of throat and nose trouble. Defective articulation, excluding those cases caused by immature age and dialect, was found to exist in 20 (5.7%) cases out of the 347 who underwent adenoidectomy and tonsillectomy and in one (3.3%) of the 30 cases who underwent adenoidectomy.

Catarrhal deafness. Catarrhal deafness was present with colds in seven cases of the group of 25 children with indistinct speech, and in four cases of the group of 20 children with defective articulation who suffered from infected tonsils and adenoids. The one child with defective articulation in the group of 30 who underwent adenoidectomy (only) suffered from a permanent hearing loss of 30-40 db. In this case, defective articulation was due to deafness. However, there were also 31 children in the group of 158 children selected for review whose articulation was normal despite vari-

able hearing (*8*). Periodic conductive deafness appears, therefore, not to effect the acquisition of correct articulation; these findings agree with those of Jordan (*8*).

When the 11 lisping children, the 25 with indistinct speech, and those children with defective articulation and catarrhal deafness are excluded from consideration, there still remains a group of 16 (4.2%) cases with defective articulation in the total group of 377 children studied. This incidence is high when the percentage incidence of speech defects of all kinds is generally thought to be about 3.3% of the school population (*15*). It would seem, therefore, that greatly enlarged tonsils definitely contribute to difficulties in articulation by reason of the restriction imposed upon tongue movements. This difficulty may produce conspicuously indistinct speech in children of good intelligence and a good speech environment in the home, but may result in defective articulation in dull children, especially if the speech environment is poor.

Articulation and deafness after operation. Articulation and clarity of speech improved dramatically after surgery in those children suffering from indistinct speech. Lisping was unaffected by operation but four cases with defective articulation were much improved; two of these had suffered from catarrhal deafness before operation. It was noted that the dyslalic children receiving speech therapy progressed at an accelerated rate after tonsillectomy and adenoidectomy. This was due to improved motor performance in part and also to an appreciable increase in alertness, concentration, and co-operation during treatment.

Hearing improved in all children after surgery except two. In several

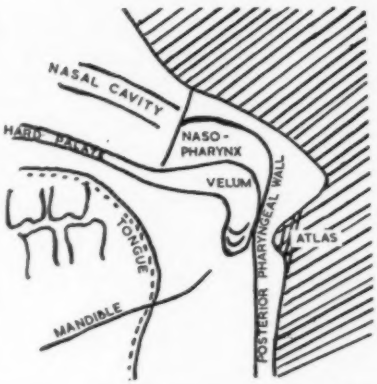

FIGURE 1. Lateral X-ray outlines of the velum and related anatomical structures in a normal individual when articulating [i:].

cases, the improvement was not an immediate sequel of the operation and further medical treatment to cure the persistent catarrhal condition responsible for conductive deafness was necessary.

Voice disorders. Hoarseness due to chronic laryngitis as noted by Makuen and Pearson (*9*, *10*) also was present in 20 (5.3%) of the children and persisted for some considerable time in seven of these cases; the voices of the rest became normal after operation. Two other little girls had remarkably deep, rough voices which had been noticed from birth and were attributed to some congenital cause. An examination by direct laryngoscopy was performed on one child but no abnormality of the larynx was observed. The child's mother stated that the maternal grandmother had always had a similar voice. The voices of these two little girls were unchanged after operation.

Disorders of nasal resonance. The most characteristic and prevalent disorder of nasal resonance was that of severely reduced nasality due to nasal

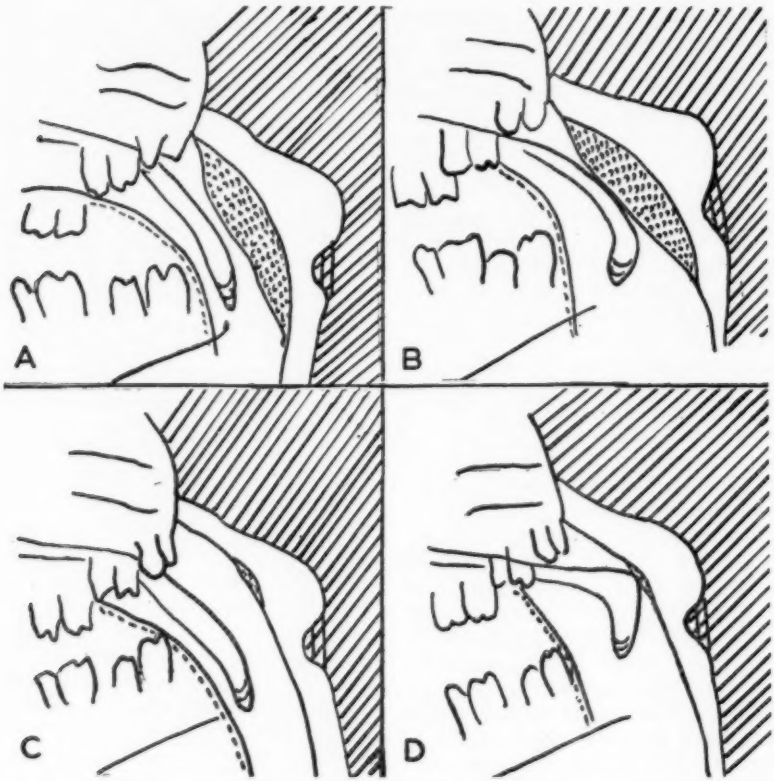

FIGURE 2. Outlines of lateral X-ray photographs of a child before and after removal of tonsils and adenoids. Adenoids are represented by stippled areas.

A. Before operation, palate at rest but held in slightly elevated position to enable mouth breathing.

B. Before operation, full elevation of palate in articulation of [i:] prevented by adenoid mass.

C. After operation, palate still elevated at rest, mouth breathing persists through habit.

D. After operation, palate fully elevated in articulation of [i:].

obstruction. The majority of children with normal speech suffered from reduced nasal resonance only with catarrhal colds. Among the selected group of 158 children reviewed after operation, defects of nasal resonance could be divided into two categories: (1) those with nasal obstruction and severely reduced nasal resonance who were chronic mouth breathers and (2) those with little nasal obstruction and almost normal resonance, but with considerable nasal escape according to the mirror test. Nasal escape of air was inaudible in normal circumstances. However, with a cold there was some

nasality of tone often accompanied by snorting sounds (nasal plosion) on plosive consonants. There was no difficulty in blowing out the carnival blower in such cases.

Typical children in both categories were selected for further examination of movement of the velum by means of lateral X-ray photography according to the procedure described by Calnan (*2*). The diagrams used to illustrate this text are outline drawings obtained from actual X-ray photographs according to the method devised by Veau (*13*). The essential outlines of tongue, palate, and pharynx

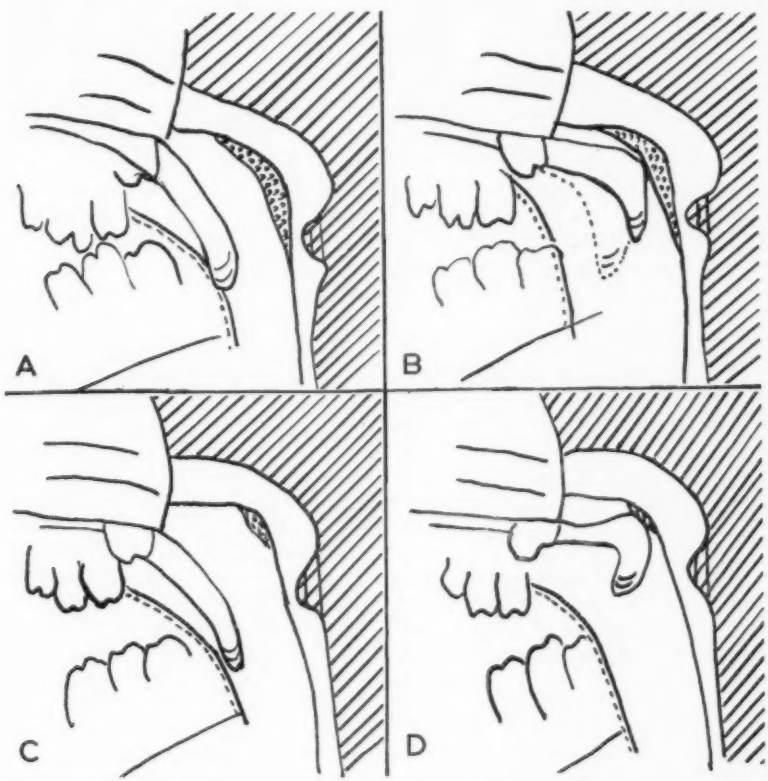

FIGURE 3. Lateral X-ray outlines of a child with nasal escape of air in speech but normal speech both before and after removal of tonsils and adenoids. Adenoids are represented by stippled areas.

A. Before operation, palate at rest.
B. Before operation, palate elevates somewhat on [i:].
C. After operation, palate at rest.
D. After operation, palate elevates normally to meet posterior pharyngeal wall on [i:].

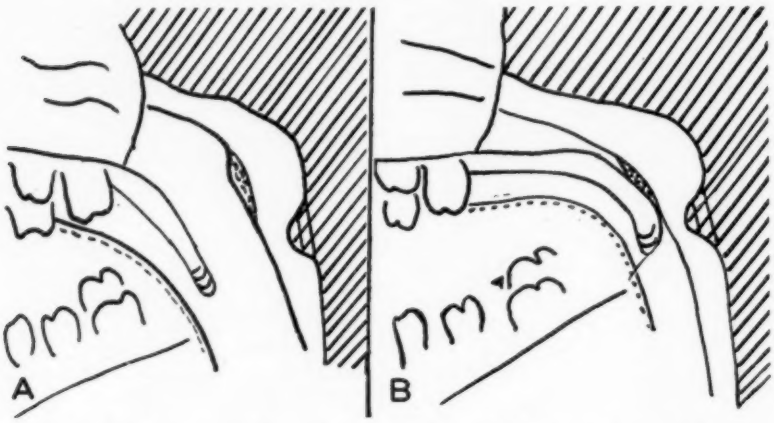

FIGURE 4. Lateral X-ray outlines of a maladjusted child with nasal speech following adenoidectomy.

A. Palate fails to elevate in articulation of [a].

B. Palate shows ability to elevate normally in crying.

are drawn in India ink, the bony mass of the skull and spine being hatched, with the landmark of the arch of the atlas clearly seen in profile. Once the outline is drawn in, the photograph is faded out so that a black diagram on a white ground remains. Figure 1 is provided as a key for the reading of subsequent diagrams.

The outlines of lateral X-ray photographs of a child in category one are shown in Figure 2. This child had tonsils which met in the mid-line and he was a mouth breather. His palate showed poor elevation in an oral examination and his speech was indistinct and lacking in nasal resonance. A and B show the condition before removal of tonsils and adenoids; C and D show the condition after surgery. Speech was normal after surgery. The X-ray photographs for C and D were taken 10 days after the operation.

Figure 3 shows the outlines of lateral X-ray photographs of a child in category two. The tonsils were enlarged but the adenoids were small; chronic catarrh and constant colds were the chief trouble. Although there was nasal escape of air in speech, the child's speech was good. The lateral X-ray shows a certain sluggishness in elevation of the palate in the articulation of [i:] due to poor tonicity of the muscles. The movement of the palate was much improved after surgery and nasal escape of air in speech was reduced. Of 41 similar cases in the survey, only two developed nasal speech after operation.

Nasal speech after surgery. Symptoms of gross audible nasal escape of air developed in 25 (7.2%) of the 347 children who underwent tonsillectomy and adenoidectomy. In the group of 30 children who underwent adenoidectomy only, three (13.3%) developed gross nasal escape. The numbers in this group are too small to provide conclusive evidence. How-

ever, the indications are that precipitate removal of adenoids, which have hitherto prevented full elevation of the palate, is a more likely cause of nasal speech than the trauma or scarring of the palate following removal of tonsils. No case of permanent limitation of movement or damage to the palate occurred. All the children who developed nasal speech were nevertheless able to blow out a carnival blower and obtain good elevation of the palate. However, they were unable to maintain the necessary fine control of movement during speech. Podvinec (*12*) has also drawn attention to the different behaviour of the palate in blowing and speech.

Duration of nasal speech. Nasal speech after operation was in the majority of cases of short duration and speech therapy was not necessary. Speech was found to revert to normal within four to six weeks, although it might remain unstable and deteriorate when the child was tired for a further two months. Nasal speech persisted in four cases for periods varying from 3-12 months and regular speech therapy was necessary. It was significant that in each of these cases the child was insecure and manifestly used nasal speech to obtain attention.

Figure 4 shows the lateral X-ray outlines of a severely maladjusted child whose nasal speech persisted for a year after removal of adenoids. The radiographer has caught a view of the child when crying which shows perfect elevation of the palate. For many months this child's speech was normal in the speech clinic but nasal at home and in school. At the present time, six months after discharge from the clinic with normal speech, she is receiving treatment from a psychiatrist on account of anti-social behaviour at home and in school.

In view of these findings in cases of persistence of nasal speech long after removal of tonsils and adenoids, it is necessary to stress the need to exclude a possible psychological cause.

Paralysis of the palate. One child with normal speech before and after removal of tonsils and adenoids developed bulbar poliomyelitis a month after her operation. Nasal speech developed as a result of paralysis of the palate but this was not an isolated symptom; there was some dysarthria associated with paralysis of the glossal, pharyngeal, and facial muscles. The child made a full recovery and speech was normal three months after she had contracted the illness.

Congenital defect in palatopharyngeal closure. One boy of seven years spoke with gross nasal escape of air in speech before removal of tonsils and adenoids. He was unable to blow out the carnival blower before operation. He had an abnormal tongue posture, with tongue tip resting between parted teeth. Speech was slurred and articulation of alveolar and postalveolar consonants was interdental. He was a mouth breather, though the adenoids were small and he was able to breathe through his nose; he often drooled and was of dull intelligence, with an I.Q. of 80.

After surgery, speech remained unchanged and a period of six months' speech therapy obtained no improvement in performance. Lateral X-ray photography demonstrated that the boy suffered from a congenital defect in the palatopharyngeal mechanism, often described as 'congenital short palate.' The pharynx was abnormally deep and wide and the velum appeared short only in relation to the pharynx. It has been found that retroposition of the palate does not reduce nasal escape of air in these cases and

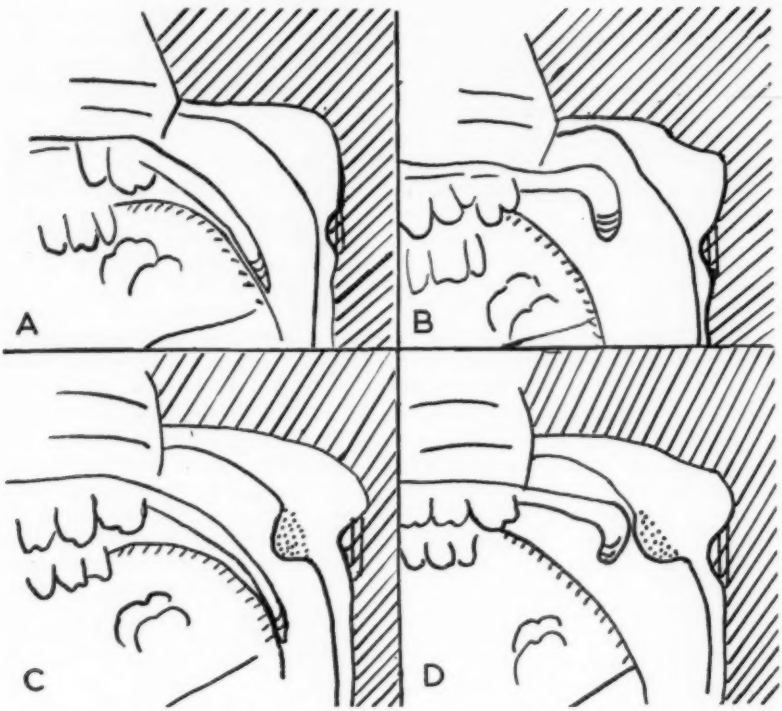

FIGURE 5. Outlines of lateral X-rays of a child with congenital defect of palatopharyngeal closure taken before and after a Hyne's (7) pharyngoplasty operation.

A. Before surgery, palate at rest.

B. Before surgery, palate fails to meet pharyngeal wall in articulation of [i:].

C. After surgery, palate at rest (note reduction in size of pharyngeal cavity and prominence of muscle transplant).

D. After surgery, palate approximates pharyngeal prominence (dotted area) on [i:].

a pharyngoplasty can be relied upon to obtain a more successful result. A Hynes's pharyngoplasty operation (7) was performed which achieved a reduction in the dimensions of the pharynx and a projecting pad of transplanted muscle on the posterior pharyngeal wall. Figure 5 shows the outlines of the lateral X-ray of this patient before and after the pharyngoplasty operation. Speech was greatly improved by surgery but some audible nasal escape of air remained, chiefly on account of the intellectual inability to make better use of the improved mechanism.

Emotional adjustment following hospitalization. The speech of the three boy stammerers in the total group of 377 children examined did not deteriorate at a result of the hospital experience. One boy of four

years developed a stammer immediately upon returning home. This child was retarded in all developmental fields and he had many defects in articulation; he suffered from petit mal seizures. Hospitalization coincided with a deterioration in relations between his parents, followed by their eventual separation some weeks later.

A total of 18 children in the group of 158 reviewed were reported to be very disturbed upon returning home, the chief indications being marked tendency to cling to the mother, often accompanied by night terrors for some weeks. The fact that so few children were upset was probably due to the happy atmosphere in the children's ward created by the sister in charge, and the fact that the children were as far as possible spared all knowledge of the operation which has been stressed as the chief cause of emotional trauma (*3*). A sedative dose of quinalbarbitone was given in a spoonful of honey or jam (according to the child's preference) so that the child was asleep before entering the operating theatre. Many nervous children enjoyed their stay in the hospital, to the surprise of anxious parents; it seemed they enjoyed the extra attention received in the hospital.

It was the impression of the hospital staff that the younger the child the more likely he was to be upset. Although the three-to-four-year-old child perhaps made more overt fuss, he appeared to forget the experience quickly, whereas the older child, though braver, remained apprehensive for a longer period. The maladjusted children who suffered from prolonged nasal speech were not unduly upset by hospitalization. Their insecurity was of long standing and rooted in the family situation; nasal speech was discovered to be a useful means of obtaining greater attention from the mother.

General improvement in the children. In the great majority of cases where a child had been really debilitated before operation, there was a remarkable improvement in his health afterwards. Parents reported that their children were no longer irritable and were sleeping and eating well. In many cases, school performance was also reported to be improved. The transformation taking place in so many children was one of the most satisfying aspects of this survey.

Summary

The speech of 377 children undergoing adenoidectomy and tonsillectomy was examined before surgery. A high incidence of defects in articulation indicates that enlarged tonsils may contribute to difficulties in articulation. The speech of 158 of these children was examined after the operation. Nasal speech occurred in 7.2% of cases following removal of tonsils and adenoids but in 13.3% cases following adenoidectomy. Recovery of normal speech was rapid except in the cases of four children who were beset with emotional problems. Hearing improved in all cases of catarrhal deafness after surgery as well as the health and alertness of the children. Few children were upset by hospitalization.

Acknowledgment

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X-ray Department of Stoke Mandeville Hospital provided the lateral X-ray photographs and Mr. R. J. Mason of the Photographic Department processed the X-ray outlines.

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Linguistic Functioning Of Bilingual And Monolingual Children

Sister Mary Arthur Carrow

There has been considerable discussion and controversy among educators and psychologists regarding the effects of bilingualism on the mental, emotional, and educational growth of the individual. It is rather widely assumed that children who learn two languages simultaneously, during the process of language development, are inferior to monolingual children in certain aspects of linguistic achievement. Few experimental studies, particularly studies involving the direct measurement of the language handicap associated with bilingualism, have been made, and the results obtained have not always been in agreement (*2*, 7, *9*, *11*, *12*, *14*, *15*). Although the majority of the investigators have reported that bilinguals are retarded in various aspects of linguistic functioning, the fact that intelligence and socio-economic status were not taken into account in the studies makes it difficult to determine whether the language retardation found was actually due to bilingualism (*4*, 7, *10*, *14*). The lack of definite answers with respect to the effect of learning two languages suggests that there is need for further research regarding the factor of bilingualism. The problem is of special importance to those educators dealing with the large Latin-American bilingual population in the Southwestern section of the United States.

The present study was undertaken in order to examine the relationship between bilingualism and the mastery of language. The problem was to study the effect of the variable (number of languages spoken) on linguistic functioning by comparing the English language ability and achievement of two groups of children who differed with respect to the number of languages learned from infancy, but who were similar in regard to age, grade, socio-economic status, and intelligence. Specifically, answers were sought to the following questions:

1. How do bilingual children compare to monolingual children in the achievement of language skills: namely, silent reading (vocabulary and comprehension), oral reading (accuracy, comprehension and rate), hearing vocabulary, spelling, and arithmetic reasoning?

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2. How do bilingual children compare to monolingual children in oral language with regard to (1) articulation, (2) verbal output as measured by total number of words used in a unit of time, (3) the extent of speaking vocabulary as measured by the number of different words used, (4) length of clause, (5) degree of subordination, (6) complexity of sentence structure, and (7) the number and type of grammatical errors?

Procedure

Sample. Four elementary schools in San Antonio, Texas, were selected as sources of subjects for the investigation on the basis of three criteria: (1) the presence in the school of children in both language groups, (2) the similarity of the schools in methods and curricula, and (3) the cooperation of the school authorities.

The third grade children of the four schools were classified, by means of information obtained from an interview with the parents, into two groups—bilingual and monolingual. Those included in the bilingual group had been exposed to the Spanish and English languages in the home from infancy, could communicate in both languages by the age of three, and preferred the English language at the time of testing. Those included in the monolingual group had been exposed only to the English language in the home from the time of infancy, and could communicate only in the English language. Since there was a wide age range within this grade level, the selection was limited to those children who were within seven months of eight-and-one-half years of age.

Children in both groups were then screened by means of speech, hearing, and intelligence tests, and those who presented organic speech problems, hearing losses, or low levels of intelligence (I.Q. of 75 and below) were eliminated from the groups. The remaining children were classified in socio-economic status according to their fathers' occupations by means of the Backman scale (*1*). Fifty monolingual and fifty bilingual children were then chosen in such a manner that each group had equal representation from the major categories in the occupational scale and equal sex ratio. The difference in mean intelligence quotients of the two language groups, as measured by the Otis Quick-Scoring Mental Ability Test, Alpha, Non-

TABLE 1. Mean scores and standard deviations of language groups on standardized language achievement tests.

Test	*Bilingual*		*Monolingual*	
	Mean	*S.D.*	*Mean*	*S.D.*
Silent reading vocabulary	45.77	5.38	47.64	5.11
Silent reading comprehension	21.44	3.84	23.04	3.66
Oral reading accuracy	26.96	3.41	31.31	9.12
Oral reading comprehension	24.40	6.51	28.80	6.37
Oral reading rate	88.74	19.76	93.49	21.04
Hearing vocabulary	32.63	6.36	38.08	5.84
Spelling	9.73	3.32	10.75	4.17
Arithmetic reasoning	19.77	6.45	23.38	4.30

TABLE 2. Analyses of variance testing differences between language groups with respect to various standardized language achievement tests.

Source	*ss*	*df*	*ms*	*F*
	Silent Reading Vocabulary			
Sex (S)	9.77	1	9.77	.36
Language groups (L)	75.69	1	75.69	2.77
S x L	64.34	1	64.34	2.36
Within cells	2621.91	96	27.31	
Total	2771.71	99		
	Silent Reading Comprehension			
Sex (S)	78.87	1	78.87	5.11
Language groups (L)	59.29	1	59.29	3.89
S x L	17.04	1	17.04	1.12
Within cells	1464.19	96	15.25	
Total	1619.39	99		
	Oral Reading Accuracy			
Sex (S)	51.43	1	51.43	.65
Language groups (L)	445.21	1	445.21	5.65*
S x L	77.71	1	77.71	.99
Within cells	7565.04	96		
Total	8139.39	99		
	Oral Reading Comprehension			
Sex (S)	.02	1	.02	.001
Language groups (L)	275.56	1	275.56	6.43*
S x L	30.75	1	30.75	.73
Within cells	4112.67	96		
Total	4419.00	99		
	Oral Reading Rate			
Sex (S)	2823.68	1	2823.68	7.17†
Language groups (L)	510.76	1	510.76	1.30
S x L	220.68	1	220.68	.55
Within cells	37823.72	96	394.00	
Total	41378.84	99		
	Hearing Vocabulary			
Sex (S)	1.87	1	1.87	.05
Language groups (L)	767.29	1	767.29	20.39**
S x L	39.42	1	39.42	1.05
Within cells	3611.73	96	37.62	
Total	4420.31	99		
	Spelling			
Sex (S)	37.25	1	37.25	3.76
Language groups (L)	26.01	1	26.01	2.62
S x L	2.25	1	2.25	.23
Within cells	952.20	96	9.92	
Total	1017.71	99		
	Arithmetic Reasoning			
Sex (S)	52.12	1	52.12	1.74
Language groups (L)	327.61	1	327.61	10.88†
S x L	.19	1	.19	.01
Within cells	2890.39	96	30.11	
Total	3270.31	99		

*Significant at the .05 level. †Significant at the .01 level. **Significant at the .001 level.

Verbal, Form A, yielded a *t*-ratio of .83. This difference was not significant at the 5% level of confidence.

Instruments. The following language indices were employed to obtain information regarding the linguistic functioning of the bilingual and monolingual subjects of the present investigation:

1. The California Test of Achievement, Primary, Form AA (*16*), was used to measure achievement in silent reading, spelling, and arithmetic reasoning.

2. The Durrell-Sullivan Reading Capacity Test, Primary, Form A, Word Meaning (*5*), was used to evaluate performance in hearing vocabulary.

3. The Gilmore Oral Reading Test (*8*), was employed to test achievement in oral reading accuracy, comprehension, and rate.

4. The Fairbanks Test of Articulation for Non-readers (*6*), was employed to evaluate articulatory proficiency.

5. A three minute sample of oral language recorded on tape was used as a basis for studying oral language functioning as measured by the total number of words spoken (verbal output), the number of different words spoken (speaking vocabulary), the proportion of predicates to other words used (clause length), the ratio of subordinate predicates to the total number of predicates (index of subordination), the frequency of use of different types of sentence construction (complexity of sentence structure), and the number and type of grammatical errors.[1]

To obtain the oral language sample it was decided that a more definitely structured techniques would be more successful with third grade children than the more widely used method of having the children talk about objects and pictures (*3, 11*). The procedure employed was to read a story to the children, and then have each child retell it to the examiner in his own words. Most of the children completed a three-minute sample of oral responses before they had finished telling the story. In the few cases where the retelling was not long enough to secure a three-minute sample of oral responses, the examiner resorted to the use of some attractive pictures of children and animals to elicit further response.

Results

Achievement in language skills. Table 1 presents the mean scores and standard deviations of the two groups under study on the standardized tests of language achievement. There were no significant differences between the monolingual and the bilingual children in silent reading vocabulary, silent reading comprehension, oral reading rate, and spelling. However, there were significant differences between the monoligual and the bilingual children, in favor of the monolingual, in the tests of oral reading accuracy, oral reading comprehension, hearing vocabulary, and arithmetic reasoning (see Table 2).

Bilingual children at all levels of

[1]A detailed discussion of these indices as measures of language maturity and the technique of evaluation may be found in the original dissertation on file in the library of Northwestern University.

TABLE 3. Means and standard deviations of language groups on oral language measures.

Measure	*Bilingual*		*Monolingual*	
	Mean	*S.D.*	*Mean*	*S.D.*
Verbal output	371.04	74.77	379.20	62.19
Speaking vocabulary	99.62	17.66	110.00	14.89
Clause length	5.85	.51	5.94	.45
Index of subordination	.28	.06	.27	.05

intelligence[2] scored lower in the language achievement tests than monolingual children at corresponding levels, except for the bilingual children of 121 I.Q. and over. The latter group either attained or surpassed the achievement of the monolinguals in the same category of intelligence on all the language achievement tests except that of hearing vocabulary. Because of the small number of subjects within each category of intelligence, statistical tests of significance were not used to compare the groups at different levels of intelligence.

The boys did not differ significantly from the girls in any of the language tests except oral reading rate, in which the girls were superior (Table 1).

Oral language functioning. Means and standard deviations of oral language measures (except complexity of sentence structure) are presented in Table 3. From Table 4 it can be seen that (1) the bilingual and monolingual children did not differ significantly in oral language functioning as measured by verbal output, clause length, and degree of subordination and (2) there was a significant difference, in favor of the monolinguals, in speaking vocabulary as measured by the number of different words spoken in a unit of time. With regard to complexity of sentence structure, there was no significant difference between the two groups (Table 5).

The number of children presenting articulation defects was greater in the bilingual (52%) than in the monolingual (14%) group. When the articulation defects were classified as to type of error (substitution, omission, distortion), it was found that the bilingual children made more errors of substitution, and the monolinguals made more errors of distortion.

The mean number of grammatical errors of the bilingual group was 6.14, whereas the mean number of grammatical errors of the monolingual group was 3.44. No statistical evaluation was made of these data because many of the subjects had scores of zero. The main types of grammatical error made by the bilingual group were in the use of the correct tense and in the correct use of prepositions.

Discussion

In each of the language achievement tests, the monolingual children con-

[2]Four I. Q. classification levels were chosen: (1) 100 and below, (2) 101 to 110, (3) 111-120, and (4) 121 and above. These particular categories were chosen because the mean I.Q.s of both groups were close to 110, and hence, about 50 per cent of the children in each language group placed in categories one and two, and 50 per cent in categories three and four.

TABLE 4. Analyses of variance testing differences between language groups with respect to oral language measures.

Source	*ss*	*df*	*ms*	*F*
	Verbal Output			
Sex (S)	473.87	1	473.87	.09
Language groups (L)	1664.64	1	1664.64	.35
S x L	6248.29	1	6248.29	1.31
Within cells	45,6763.76	96	4757.96	
Total	46,5150.56	99		
	Speaking Vocabulary			
Sex (S)	3.82	1	3.82	.02
Language groups (L)	2693.61	1	2693.61	10.33†
S x L	1106.06	1	1106.06	4.24*
Within cells	25041.90	96	260.85	
Total	28845.39	99		
	Clause Length			
Sex (S)	.16	1	.16	.70
Language groups (L)	.21	1	.21	.91
S x L	.01	1	.01	.04
Within cells	22.51	96	.23	
Total	22.89	99		
	Index of Subordination			
Sex (S)	.02	1	.02	.06
Language groups (L)	.36	1	.36	1.03
S x L	0.00	1	0.00	0.00
Within cells	33.66	96	.35	
Total	34.04	99		

*Significant at the .05 level.
†Significant at the .01 level.

sistently scored higher than the bilingual children, although the differences were not significant in all cases. Figure 1 gives an idea of the extent of the differences between the groups from test to test when the median scores are converted into grade equivalents.

It was found that the monolingual children were significantly better than the bilingual children in speaking and in hearing vocabulary but not in silent reading vocabulary. The similarity of the two groups in silent reading vocabulary may be attributed to the fact that both had had the same amount of formal classroom instruction in reading. At the third grade level, performance on a reading vocabulary test depends largely on the recognition of words previously learned in reading class, since the third grade child has not acquired the ability to work out new words from recognition or context clues. As the grade level increases, skill in working out new words increases, and, therefore, beyond the third grade, performance in reading vocabulary may be expected to conform to the performance in speaking

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TABLE 5. Values of *t* yielded by comparison of the percentage of various sentence types for the language groups.

Sentence Type	*Difference*	*t-ratio*†
Functionally complete but structurally incomplete	0.21	.05
Simple without phrase	3.79	.44
Simple with phrase	−4.24*	.49
Complex	1.78	.26
Elaborated	−2.20	.26
Incomplete	1.42	.25

*The minus sign indicates that the difference is in favor of the monolinguals.

†*t* .05 = 1.99.

and hearing vocabularies. If the child has a good speaking and hearing vocabulary, as in the case of the monolingual, then his achievement in total reading vocabulary will increase. If his hearing and speaking vocabulary is poor, as in the case of the bilingual child, this factor may be found to have a deleterious effect on his total reading test score. Russell (*13*) states that, in general, a small speaking and understanding (hearing) vocabulary will not begin to affect the reading success of children until some time in the third grade when they begin to branch out more widely in their reading. Therefore, if the children were to be retested at a higher grade level, the monolingual children might be found to be significantly better in silent reading ability.

There was also a discrepancy between the results on the silent reading comprehension test and the oral reading comprehension test. In oral reading comprehension, the bilinguals differed significantly from the monolinguals, whereas, in silent reading comprehension, they did not. The retardation of the bilinguals in oral reading accuracy and comprehension may have been related to the large number of bilinguals with articulation difficulties. Because of the substitution of certain sounds for others, certain words were also substituted for others. This, in turn, may have resulted in a lack of comprehension of the paragraph read. This hypothesis was substantiated when the bilinguals with articulation difficulties were compared with the bilinguals without defects in oral reading accuracy and comprehension. It was found that the bilinguals *without* articulation difficulties were significantly better in both oral reading skills than those *with* such defects. The *t*-ratios were 2.05 and 2.41 for differences between the means on the oral reading accuracy test and the oral reading comprehension test, respectively. Both were significant at the 5% level of confidence. However, the factor of intelligence was not taken into account in this comparison.

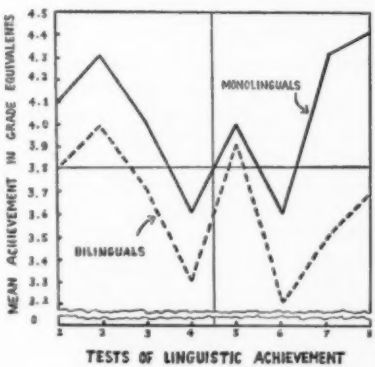

FIGURE 1. Comparison of language groups on tests of linguistic achievement: (1) Silent reading vocabulary; (2) Silent reading comprehension; (3) Arithmetic reasoning; (4) Mechanics of English; (5) Spelling; (6) Oral reading accuracy; (7) Oral reading comprehension; and (8) Hearing vocabulary.

The results do not provide explanation of why the bilinguals differed from the monolinguals in arithmetic reasoning. One possibility is that, although the bilingual children were successful in understanding reading selections and in answering questions when the answers were directly stated in the selection, they may have had difficulty with more complex reading situations in which making inferences and interpreting abstract words were required.

The numerous errors in articulation and in grammar suggest that the bilingual children were experiencing difficulties resulting from their two-language heritage. They not only had more deviations, but their difficulties were of a different type from those presented by the monolingual children. The nature of these difficulties suggested that they sprang from confusions of the linguistic and sound patterns of the Spanish and English languages. The present study produced no evidence for concluding that the confusions were due to the fact that the children had learned two languages. The confusions and the resulting errors may have originated in the early stages of familial immigration and the transition of language and may have been perpetuated through environmental factors. The fact that there was a large number of bilingual children who presented no difficulties suggests the possibility that the core of the problem was not bilingualism *per se*, but the type of environment in which the bilingual child had been reared.

The bilingual children did not differ significantly from the monolingual children in those measures of language maturity and achievement which did not require a knowledge of the meaning and pronunciation of words, such as spelling, oral reading rate, verbal output as measured by the number of words spoken in a three minute period, length of clause, degree of subordination, and complexity of sentence structure.

Only to the extent that the procedures employed in the present study were successful in controlling the variables of social status and intelligence, and successful in isolating the factor of bilingualism, can the significant differences in linguistic functioning between the monolingual and bilingual children be attributed to bilingualism. Within these limits, it is concluded that in the bilingual group studied, bilingualism had a deleterious effect on those aspects of language development related to vocabulary and articulation. However, it has been suggested that a differentiation should be made between the language difficulties arising from bilingualism, *per se*, and those stemming from a bilingual environment. The language handicap of the bilingual children in this study may have been related to the presence of confused and incorrect language patterns in the home and a meager background of language experiences, rather than to the actual learning of two languages. If this was the case, bilingualism would not be detrimental to all bilingual children, at all ages, at all periods during their lives. In homes where there is a language atmosphere that is favorable to wide experiences in both languages and where good speech models are present, the bilingual child may not experience any problem in either language.

Educational Implications

1. In dealing with the bilingual Latin-American children in schools, guidance should be given in correct-

ing and enlarging meanings of words, and in acquiring mastery of new words. Two of the most valuable means of developing an ample and correct vocabulary are: (1) providing a rich and stimulating background of first-hand experiences, and (2) offering numerous opportunities to the children for oral language listening and expression.

2. Special attention should be given to the articulatory differences of the bilingual Latin-American children. Since the articulation problems of these children are so similar, training procedures may be administered on a group basis. A program of speech improvement would be helpful to all children, not only to those who have special problems.

3. Teachers of the bilingual Latin-American children should be conversant with the language problems of these children, particularly with regard to their difficulties with word meanings and grammatical errors. The teachers should have special training in speech therapy and phonetics so that they can recognize and correct the articulatory defects of the children.

Research Implications

The needs and possibilities for research in the area of bilingualism are numerous. Suggested areas for further study will be given here only so far as they are pertinent to the findings of the present investigation:

1. A well-controlled, experimental study of the relationship between bilingualism and the mastery of language at different age and grade levels would be of value in helping to understand the language problems of bilingual children throughout their school career.

2. Of significant importance would be an investigation comparing the language functioning of monolingual children and bilingual children at different levels of intelligence and socio-economic status.

3. A comparison of the language functioning of bilingual children who learned two languages during infancy with those who learned the second language at a later stage in language development would yield important information with respect to the optimum age for learning the second language.

Summary

A comparison of English language ability and achievement was made between a group of monolingual children and a group of bilingual children who were similar in regard to age, grade, socio-economic status, and intelligence. The major findings are summarized as follows:

1. There was a significant difference between the language groups, in favor of the monolingual group, in the tests of oral reading accuracy, oral reading comprehension, hearing vocabulary, arithmetic reasoning, and speaking vocabulary.

2. No significant difference was found between the language groups in silent reading comprehension, silent reading vocabulary, oral reading rate, spelling, verbal output, length of clause, and degree of subordination.

3. The bilingual group made more and different types of articulatory and grammatical errors than the monolingual group.

4. The boys did not differ significantly from the girls in any of the measures of language functioning except that of oral reading rate, in which the girls were superior.

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Case Study Of Delayed Language

Ruth S. Blackman

R. Ray Battin

Delayed speech is often a diagnostic problem. The case reported here of a child with delayed speech is of special interest, in that his medical and developmental history tended to support a diagnosis of either brain injury or mental retardation. However, environmental factors were such that they could have precipitated or maintained the speech problem.

History. David, the subject of this report, was born August 26, 1952. He was the first child of an Rh negative mother and an Rh positive father. The pregnancy was normal but at birth the baby did not breathe and was subsequently placed in an air lock for 30 hours. When David was 16 months old, he had an infection which resulted in an attack of vomiting, diarrhea, and a convulsion associated with high fever. He became cyanotic as a result of the convulsion and remained that way for almost an hour. During the remainder of the illness he had several seizures, all of which were associated with high fever. There were no additional seizures following the termination of the infection.

David's developmental history up to the time of his infection was normal. He sat alone at five months of age, crawled at nine months and walked at 13 months. He had his first tooth at eight months. Babbling and vocal play were reported to be normal and he said his first word at 12 months. Language was approximately appropriate for his age level at the time of illness.

Diagnosis. David was first seen at a children's clinic for neurological disorders when he was two years, nine months old. His physical condition was normal, except for a moderate hyperflexia in the lower extremities. Speech was absent. Laboratory studies, including X-rays of the skull and an electroencephalogram, were negative. Some hyperactivity, a short attention span, and good motor development were noted. The clinic felt that his difficulty was the result of neonatal anoxia, that he was probably mentally retarded, and that prognosis for speech development was fair. He was referred to a speech and hearing diagnostic center for further study. This center found no indications of a hearing difficulty and made a diagnosis of language retardation with the cause probably related to brain damage.

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It was recommended that David have a psychological evaluation to determine his mental status and further explore etiological factors. This was done when David was three years, two months of age. The Nance Tests for Measurement of Mental Ability and the Revised Stanford-Binet Scale, Form L, indicated that David had normal intelligence. He adequately performed tasks involving visual-motor coordination. His ability to comprehend and follow directions was above average.

David's behavior during testing was noteworthy. He entered the testing situation in a disinterested fashion. At first, he cooperated when instructions were given by demonstration (puzzles, form boards, *etc.*) but ignored verbal directions (*e.g.*, 'Show me the car.'). However, as the session progressed, he responded to verbal directions, even when the distance involved the length of the room. His utterances contained inflections that usually accompany speech, but no intelligible words were spoken. David seemed to be aware of failures and was pleased with success. Although David was passive toward some tests, his total performance was in sufficient quantity to permit a valid appraisal of his intellectual abilities. After the tests were completed, David was encouraged to participate in free play; however, he responded by looking out the window or wandering aimlessly around the room.

Therapy. David was assigned to a therapy program designed primarily for brain-injured children between the ages of three and five who had a language involvement. The class met for two hours a day, five days a week. There were six children enrolled. Formal speech drill was not employed; instead, emphasis was placed upon utilizing the natural growth of the child in stimulating language. Freedom of activity and expression were encouraged, thus offering maximum stimulation for speech without placing pressures upon the child. There was some scheduling of activities in order to offer a form of security to the children, but it was flexible enough so that the daily needs of the children could be met. Group meetings and individual counseling sessions were held with the parents because it was felt that these contacts were an important part of the total therapy program. These counseling sessions revealed parental rejection of David, as a result of the pregnancy having terminated the college education of both parents. The father bowed under pressure of in-laws and left college to support his family. Thus, guilt feelings were created in the parents and were manifested in their rejection of the child, as evidenced by constriction, perfectionistic demands, and such a rigid discipline that even normal vocalization was prohibited. Through parental counseling, the mother and father gained sufficient insight and an understanding of their feelings and attitudes to improve the home situation subsequently.

David was placed in the group on an observation basis. During this time it became apparent that he did not exhibit the characteristics of a brain-injured child. It was decided to continue him in the program but to adapt it to meet his particular needs. When he first entered into the therapy program, he was very constrained in everything he did. He was reluctant to soil his hands. He became disturbed when sand, finger paints, or similar substances got on his hands. He was unable to express himself except through very controlled, withheld

means. His speech consisted of four words plus an idioglossia which took the form of a mumble having appropriate inflection and rhythm. The parents reported compulsive type behavior in the home, and there was evidence of a similar form of behavior in the classroom.

Progress was first seen in David's relationships with the other children. He gradually became a part of the group and entered actively into all group activities. He began to assert himself more and became less dependent. At the same time, evidence of mischievousness began to appear both at home and in the therapy program. He used three words clearly and spontaneously: 'mine,' to indicate his possession of a toy, 'milk,' to receive further refreshments, and 'ball,' during a group activity using the ball. During this growth period, David's parents received counseling regarding the rigid standards which they had set up for the child. The mother began to verbalize her feelings of resentment and rejections.

As avenues of expression began to open up, David was able to release his feelings. He used open, sweeping strokes in his finger and brush painting and he began to combine colors. When working with clay, he molded cars, balls, snakes, and animals rather than working with small portions or breaking the clay into minute pieces as he did initially. He laughed, giggled, and vocalized loudly when playing with toys. He began to initiate group activities and engage in imaginative play activity. He slapped or pushed the other children when defending his toys or asserting his leadership. His vocabulary increased to about 15 single words and a few phrases.

David was seen in a short play therapy session by the psychologist. David was quite relaxed this time, in comparison to the initial contact. Use of colors and method of approach in finger painting suggested little of the constriction observed in the first session with the psychologist. Play with family figures revealed some hostility toward self and mother. The father figure seemed to play a minor role. The psychologist's observations supported those of the therapist; namely, that David responded to therapy more like a child with an emotional involvement than one with an injury to his brain.

After five months of therapy, David was taken out of class for a two-week period for a tonsillectomy. When David returned to class, he was using sentences for communication. Although there were some phonetic inconsistencies, his speech was understandable. When naming pictures or objects, he always referred to them as 'my doggie,' or 'my house,' *etc.* While he continued to be a quiet child, he was no longer withdrawn and there was evidence of considerable creative activity. It is felt this rather dramatic growth in language development and behavior resulted from a combination of factors. These included reduced sibling rivalry, a more congenial home environment, increased attention given him as a result of his illness, and participation in the therapy program.

Two weeks after his return to class, David broke his leg. During his absence, parental counseling was continued. A detailed check of his speech and behavior was maintained by both the psychologist and therapist. Language and behavior growth continued in the home environment until it approximated his chronological age level. Although he continued to have some

phonetic inconsistencies, it was decided to terminate speech therapy for a trial period in order that his language patterns might become established in a normal speech environment.

Summary

This is a case study of a child with delayed language who was referred to the therapist as a possible brain-injured or mentally retarded child. Certain facts in his medical and developmental history suggested such a diagnosis. Subsequent mental tests indicated normal intelligence. Characteristics usually associated with a brain-injured child were not apparent; that is, visual-motor coordination was adequate, comprehension of (and response to) auditory directions were within normal limits, negativism appeared to be voluntary, and constriction was more rapidly reduced and aggression more quickly released than one would ordinarily observe in a brain-injured child. When language forms could be observed, it was apparent that they were more closely associated to those of an emotionally disturbed child.

The subject was assigned to a language development class which employed non-directive techniques. Parental counseling was conducted in conjunction with this. Progress was seen as parental understanding and the home environment improved.

Effects Of Auditory Masking Upon The Speech Of Stutterers

Jean Ann Maraist

Charles Hutton

The causal factors of stuttering have been the subject of considerable investigation during the past 25 years. In several instances, importance has been attached to the role of the hearing mechanism. The basis for this interest is apparently two-fold. First, it has been observed (*4*) that stuttering is present only to a negligible degree among the deaf and hard of hearing, and that the case histories of these stutterers indicate that the hearing loss was adventitious rather than congenital. These data seem to indicate that normal hearing acuity is a prerequisite to the onset of stuttering. Second, studies by Paruzynski (*5*), Shane (*6*), and others, show that when the stutterer is unable to hear himself, he stutters less. Thus, a functional hearing loss seems to have about the same effect that an organic hearing loss has on the occurrence of stuttering.

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These audiologic considerations are especially important if the theoretical framework proposed by Fairbanks (*3*) is used to explain the operation of the speech mechanism during stuttering. According to this theory, the stutterer misevaluates his own speech output at some point in the control system and finds error where, in reality, no error exists. The result of his attempt to correct this non-existent error is stuttering behavior. However, if the auditory feedback loop of the stutterer could be disrupted temporarily, then these misevaluations should not occur and his speech should approximate normalcy. The present study is an investigation of the effect of various levels of auditory masking on the speech output of stutterers.

Procedure

The experimental subjects consisted of a group of 15 young adult stutterers, 14 males and one female, with a mean age of 20 years. The stimulus material was a set of five 75-word passages to be read aloud by the subjects under the five levels of masking noise, the five passages being used to minimize adaptation. As a means of

eliciting extemporaneous speech, each passage was followed by a set of four questions concerning content of the passage. The present report is concerned only with the oral reading of the passages. In a further attempt to limit the amount of adaptation to the experimental situation, the reading of the five passages was divided into two sessions, two days apart. Two passages were read at one session, three passages at the other, the number of passages read at each session being systematically rotated among subjects. Thus, odd numbered subjects read three passages during the first session and two passages during the second session. Even numbered subjects read two passages in the first session, three in the second.

The order of presentation of the masking levels and passages was a random sequence within the framework of a 5x5 Greco-Latin square. By using this procedure, each of the five masking levels appeared only once in each row of the five subject orders. Each level also appeared only once in each column of the five readings. The five passages were similarly arranged with the further restriction that each passage was combined only once with each masking level. This resulted in the 25 different combinations of masking levels and passages necessary to form a 5x5 square. The five combinations which appeared in any one row formed the presentation order for one subject. The square was then repeated three times to supply 15 orders.

The subjects were placed in a sound-treated room connected to a control room by a window and by patch cords. The equipment for presenting the various noise levels to the subjects consisted of a locally constructed random noise generator, a Magnecorder PT6-J amplifier, a Williamson power amplifier, a Hewlett Packard attenuator, a line transformer and a pair of Permoflux PDR-1 earphones. The subjects spoke into an Electro-Voice 630 microphone and the readings were recorded on tape. No earphones were worn for the condition of zero noise level.

The masking levels utilized in this experiment were calibrated by having a group of ten college students with normal hearing detect the presence or absence of white noise presented to them through a set of earphones. The ten listeners were presented with ten levels of noise, five of which were well above the threshold of audibility and five of which were well below the threshold of audibility. The levels were then decreased and increased, respectively, until points of inaudibility and audibility were reached. A mean of the values for all subjects was obtained. From these data, the presentation levels of 30 db, 50 db, 70 db, and 90 db above the normal noise detection threshold were derived.

TABLE 1. Mean number of errors, number of words, duration, and words per minute as a function of masking level.

Masking in db	*Number of Errors*	*Number of Words*	*Duration in Seconds*	*Rate in w.p.m.*
0	26	75.1	56	78
30	22	74.8	50	90
50	18	75.1	33	138
70	11	75.1	36	126
90	6	75.1	31	144

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TABLE 2. Mean number of errors, number of words, duration, and words per minute as a function of passage.

Passage	*Number of Errors*	*Number of Words*	*Duration in Seconds*	*Rate in w.p.m.*
A	15	74.7	46	96
B	16	75.1	45	102
C	17	75.1	42	108
D	17	75.5	45	102
E	17	75.1	41	108

The subjects were brought into the laboratory one at a time and were seated in front of a microphone in a sound-treated room. The experimenter read a set of instructions; then the earphones were placed on the subject's head and he was handed a card on which the first passage was typed. He then read it aloud into the microphone, under the noise level determined by his speaking order. Following this, the next passage (or two, according to his session) was read under the appropriate masking level. At the second experimental session, the subject read the remaining two or three passages under the prescribed noise levels.

Four measures were made of the readings: (1) the reading time for each passage from the beginning of the first word to the end of the last word; (2) the number of deviations from the normal production of a sound, syllable, word, or phrase, silent blocks, hard contacts, and prolongations, with each component of a multiple repetition counting as one error; (3) the number of words read in each passage (when reading unfamiliar materials, subjects may add words which are not in the passages and/or omit words which *are* in the passages); and (4) the rate in words per minute for each passage. The above four measurements were tabulated by masking level, by passage, and by reading order.

Results

Masking. The data pertaining to errors, words, duration, and rate as a function of masking levels (passages and reading sessions pooled) are presented in Table 1. The first measure, the mean number of errors, is seen to decrease in approximately equal amounts as the masking level increases. Since the number of words read appears to have remained essentially constant throughout the several levels,

TABLE 3. Mean number of errors, number of words, and duration of passages as a function of reading sessions.

Reading	*Number of Errors*	*Number of Words*	*Duration in Seconds*
1	22	74.9	50
2	13	75.3	39
3	19	74.9	47
4	12	75.2	43
5	17	75.1	39

TABLE 4. Rate in words per minute as a function of reading sessions.

Reading	*Sessions Pooled*	*Session One: 3 readings Session Two: 2 readings*	*Session One: 2 readings Session Two: 3 readings*
1	90	114	72
2	114	132	102
3	96	144	66
4	102	144	78
5	114	150	90

the progressive reduction of errors can be directly attributed to the effect of the increasing auditory masking. As would be expected from this decrease in the number of errors, the data also show decreases in reading time of the passages as a function of increasing masking level. Most noticeable is the large decrease at the 50 db level. Since decreases in errors are apparently not directly related to decreases in duration, changes in the former probably do not completely account for changes in the latter. The net result of decreases in both the number of errors and the duration of the passages, the number of words read remaining constant, was a substantial increase in the number of words spoken per minute. In fact, at the 90 db level, the subjects' mean rate of 144 words per minute fell within the normal range reported by Darley (*1*). Because of the large decrease in duration at the 50 db level, the greatest change in rate also occurred at this point.

The finding that the 50 db masking level produced such sizable decreases in the several measures of severity of stuttering is noteworthy. At this level, the number of errors was decreased by 31%, the duration by 41%, and the rate increased proportionally. Inspection of the data in Table 1 also reveals that little change took place in duration and rate between the 50 db and 90 db levels. The fact that such a relatively low masking level had a substantial effect on the operation of the speech mechanism would seem to be an important practical finding, since it is considerably below the levels used by Paruzynski (*5*) and Shane (*6*). It is also well below the threshold of tolerance reported by Davis (*2*). Further, a noise of this magnitude could easily be built into a small portable amplifier which could be used in a clinical situation.

Passages. The differences between errors, words, duration, and rate for the various passages (masking levels and reading sessions pooled) appear in Table 2. The relative constancy of these data indicates that the passages were of approximately equal difficulty.

Reading sessions. Data pertaining to reading sessions (masking levels and passages pooled) are presented in Tables 3 and 4. Differences in numbers of errors, duration, and rate appear among the five readings, with a slight downward trend in errors and duration and an increase in rate. The nature of these fluctuations can be understood by examining the last two columns in Table 4. In column 3 it may be seen that the rate of the first three readings, which constituted the first experimental session for the subjects involved, increased progressively, indicating adaptation to the experimental situation. Two days later these same subjects came back and read the

remaining two passages. Again, adaptation was evidenced. In the fourth column, evidence of adaptation is seen between the first two and last three readings. The pooled data are presented in the first column. These data indicate that there was adaptation during the reading of the five passages, this adaptation being modified by the use of two reading sessions.

Summary

In an investigation of the effects of auditory masking upon the speech of stutterers, a group of fifteen stutterers read aloud a set of five passages under five levels of masking noise. The major results and conclusions were as follows:

1. The number of errors and the duration of passages decreased as masking level increased from 0 db to 90 db.
2. With the number of words remaining approximately constant, the rate in words per minute increased as the masking level increased. The subjects' mean rate of 144 words per minute under 90 db masking noise approximated normalcy.
3. Since the relatively low masking level of 50 db produced sizable decreases in the severity of stuttering, this method of limiting stuttering would seem to be clinically feasible.

These findings appear to be in accord with the proposition that the hearing mechanism may be a factor in the etiology of stuttering.

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A Point Of View About 'Stuttering'

Dean E. Williams

The purpose of this article is to present a point of view about the speech behavior labeled 'stuttering,' along with relative implications that appear pertinent when one studies and attempts to formulate retraining procedures. Emphasized particularly is the so-called 'stutterer's' way of thinking, both about himself as a speaker and about the things he does as he speaks.

What the writer wishes to contribute most distinctively is a manner of speaking or a way of thinking about the problem. This way of thinking respresents a trend observed in such allied fields as sociology and psychology. It is a trend away from animism, from separation of mind and body, from special entities within a person over which he has no control, from circular thinking, *etc.*, toward a more scientific, more descriptive, process-like manner of talking about a problem such as stuttering. It should be emphasized that much of the discussion by Johnson (*2*) is reflected in the present paper. As such, it would be impossible to separate and document each reference. The same is true, although to a lesser degree, for the writings of Young (*4*) and of Chase (*1*).

It is recognized that one cannot discuss a 'way of thinking' about a particular problem such as stuttering without implying, either implicitly or explicitly, certain assumptions about the nature of that problem. Research data should be considered, of course, in deciding what constitutes the basis of a logical assumption. Johnson (*3*) presents an excellent summary of the more important research findings that are known about stuttering, and there appears to be little need to repeat them here. According to present day knowledge, it appears most reasonable to conclude that those persons who come to be classified by themselves or by others as 'stutterers' are not distinctive from other persons, either neuro-physiologically or with respect to basic personality structure. It is assumed, therefore, that what we call 'stuttering' is a way of speaking that has been learned by the speaker.

The point of view. When a person who we say 'stutters' comes to a clinic for therapy, he comes with a particular *point of view* about his problem. This is obvious. To describe that point of view, however, is difficult. One of the more obvious ways in which it is exemplified is by the observation that if he is asked to describe a given instance of the behavior that

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he calls 'stuttering,' he is generally aware of little more than the seeming fact that he 'just stuttered.' To him, it just happened! By this he implies that he is not clearly aware of what there might be to describe, and that there need be no explanation of his 'stuttering' beyond the rather obvious conclusion that he *is* a 'stutterer.' He considers that he defined the problem when he confessed 'stuttering.' This kind of reasoning in turn implies that he is referring to an attribute of himself, a 'part of him.'

When a person begins thinking that a certain way of behaving is 'part of him,' or 'just the way he is,' it represents a relatively basic orientation that is reflected in the way he talks about himself. It implies that he is a certain kind of person. He believes that he may change certain ways of acting but that he cannot change the fundamental 'him.' In this context, the 'him' seems to represent a special entity inside his body. This orientation is reflected in the attitude of a person who excuses himself from social activities by saying: 'I can't meet people very well because I'm too shy.' Yet, if one would ask him why he considers himself shy, he would likely answer that obviously he is shy because he cannot meet people very well. By the use of such circular thinking, he is talking and acting as if the attribute of 'shyness' is inside of him and there is nothing he can do about it. He is apt to explain his felt inability to meet people with a statement such as: 'I guess that's just the way I am.' Who is this 'I' that appears to be unchangeable? Young (*4*) demonstrated considerable insight into this question when he wrote: ' . . . man speaks about himself by the use of visual comparison, supposing that the special entity "I" of which he wishes to talk lies inside the body, as a person lives in a room.'

The person who we say 'stutters' demonstrates a similar point of view when he begins talking about 'my stuttering.' To him, it represents something that just happens because he is a 'stutterer.' He reports that when he gets a particular feeling in his stomach or in his chest this is a sign that 'it is about to happen.' Therefore, his attempt to talk is combined with an attempt either to 'hold the stuttering back' or to 'get the words out without the stuttering coming out too.' In this sense, his stuttering is an entity, an animistic 'thing' that lies inside him. This is fundamentally a belief in magic. He talks and acts as though he believes either that there exists a little man inside him eager to grab certain words, or that certain words are possessed of physical properties such that they get 'stuck' in his throat. 'When I talk, I try to hide "it".' 'I feel like "it" is going to happen.' ' "It" stops me from talking.' These statements, and more, are quite common in the clinical situation. The word 'it' has been placed within quotations because of its frequent use as a referent to nothing more than an undefinable 'thing' inside him. As long as one functions as though an 'it' makes things happen, he is not motivated to observe cause and effect relationships in his behavior, for 'it' is both cause and effect.

The person who stutters is not prepared to study the confusion in the ways he is talking about himself, a confusion between what *he* is doing and what he thinks is being done *to* him. It is no wonder that he may stand in front of an audience 'waiting for the word to come out,' not realizing that the thing he is doing, *i.e.*, waiting, serves to confirm his fear that

'it won't come out,' that it is therefore 'stuck,' that he 'cannot say it.' To him, at that moment, 'stuttering' happened to him! This view of the matter creates a feeling of helplessness, a feeling of being trapped. This kind of thinking produces embarrassment and fear, because this 'thing' is apt to happen to him at any time, especially when it is least wanted. Hence, the speaker builds up a variety of special things to do in order to 'help' the word come out, or to avoid the 'trouble' altogether. It should be pointed out that not only the so-called 'stutterer,' but oftentimes the therapist operates with the kind of orientation described above. It is obvious that when a therapist begins working with a person who stutters, he trains that person to think the way he, the therapist, thinks. That is, he tries (consciously or unconsciously), in some degree, to train the speaker to approach his problem in the way in which he, the therapist, approaches it, to use the language he uses, and to make the assumptions he makes.

In the past, considerable research on stuttering has been done from the point of view that there was something physiologically or psychologically different about a person who stutters; that is, that either there was an organic factor which precipitated and accounted for his kind of behavior or that there was a deep emotional disturbance of which the stuttering was merely the symptom. In either event, there was assumed to be something present within the so-called 'stutterer's' mind or body which made him different from other persons. Operating with this dualistic philosophy, the early researcher and theorist looked for the 'it' which seemingly *made* the person stutter. Out of this orientation was developed particular ways of talking about stuttering. It was a language structure built around the accepted assumption that there was a 'something' there. This language fitted precisely into the language structure and thinking of the person who, it was assumed, 'possessed this stuttering.' The research worker and the therapist talked about spasms due to 'it,' symptoms of 'it,' tonic and clonic blocks caused by 'it,' *etc.* Unfortunately, these terms, or terms with similar implications, have persisted and are in use today. Even though there is a much greater tendency, in view of more modern pertinent research, to consider stuttering as learned ways of talking, we oftentimes only partially discuss these ways of talking as though they were actually learned.

There is still the tendency, then, to talk as if (and to approach the problem as if) a 'something' were there. This becomes especially important in the therapy situation, where the person who stutters is already confused by his belief that 'it' makes him talk the ways he does. He interprets the clinician's statements with reference to his own point of view. The therapist may be using the word 'stuttering' merely as a label to refer to the observable behavior, while at the same time recognizing the problem as one involving a behavioral reaction pattern. To the person with the problem, however, it represents much more than, or even something quite different from, this. As was pointed out previously, the word 'stuttering' refers, as he uses it, to an entity 'within him' of which the overt behavior patterns are merely the symptoms. The point of view represented by this kind of thinking becomes evident when one asks: 'They are symptoms of what?' From reactions to this question, one reaches the puzzling con-

clusion that apparently one is being invited to regard stuttering as the symptom of stuttering. To the person who stutters, the things that he hears and sees himself do represent only the surface part of the problem that in spite of himself, he was unsuccessful in hiding. With such an orientation, attempts to teach him to *control* his 'stuttering,' as the clinician defines it, do not clarify the problem for him. With these instructions, he attempts to control in an acceptable way 'something' which he has been trying desperately to control all along. That is, he is asked to control the things he is doing that (to him) represent an unsuccessful attempt at controlling in the first place.

The person who stutters may learn to vary, or to control the 'overt stuttering,' but to him 'his stuttering' is a constant, an entity, a *something* that still remains. Therefore, even if he reduces to a considerable extent the overt activity of tensing, holding of breath, *etc.*, 'it' is still there, and he feels he must control it at all times or it is liable to appear again. The clinical problem created by this concern that 'it will come back' is a common one. It illustrates a belief in magic. *What* will 'come back?' It is clear that, generally speaking, he is afraid that something will happen *to* him. He is not aware that what he calls his 'stuttering' are behavioral processes created by himself. He divorces himself from responsibility for his actions. Otherwise, it would be obvious that he will, *e.g.*, begin holding his breath, as he talks when–and not until–he begins holding his breath. There is nothing to 'come back,' as such. There are, however, certain things he may begin doing to interfere with talking because he is afraid 'it' will come back.

It has been pointed out that the person whom we label a 'stutterer' is confused by the relationship of his concept of 'stuttering' to the process involved in talking. This confusion should be taken into consideration in developing both a way of talking about the problem and a point of view toward therapy.

It can be extremely clarifying to refrain from using the word 'stuttering' in the clinical situation. This is not just a verbal gymnastic. It is important because it forces the person to describe what he, himself, is doing that he is calling 'stuttering.' Far too often it is assumed that there are two kinds of speech, *i.e.*, stuttered and non-stuttered. When a person operates from this point of view, he assumes that when he is 'stuttering' he must stop it before he can 'begin speaking again.' Conversely, he believes that when he is 'speaking without stuttering,' it is acceptable to add anything he can to the process of speaking (tensing, gasping for breath, *etc.*) in order not to 'begin stuttering.'

This point of view becomes even more confusing when the so-called 'stutterer' states that he holds his breath, tenses his lips, *etc.*, in order to keep from stuttering. Yet these are the things we, as observers–and he, if he looks in a mirror, refer to *as* his 'stuttering.' If one begins describing the speaking behavior and omits the word 'stuttering,' it can be extremely sobering to re-evaluate what the subject is doing. He is apparently holding his breath, *e.g.*, in order to keep from holding his breath. This example of the multiple meaning of the word stuttering can be carried one step further. He often makes a statement similar to the following: 'Once I begin stuttering, I blink my eyes in order to get going again,' (or the term might be 'in order to release the block'). From a descriptive standpoint, one observes him blinking his

eyes apparently in order to stop holding his breath.

This kind of thinking is extremely confusing, unless one realizes that the 'stutterer' is acting as he believes 'stutterers' have to act. He is acting as though he believes that there is an entity inside him called 'stuttering' that makes the words get stuck in his throat, that makes his breath stop, in short, that makes things happen *to* him. As such, he continues to operate as though he believes that the things he is doing while talking are entirely unrelated to the things he is doing that he calls 'stuttering.' There appears to be a general unawareness that the special things he does while 'trying to talk without stuttering' (beginning to tense his jaw muscles, beginning to hold his breath, *etc.*) are the things that interfere with speaking. It should be emphasized that the segment of behavior usually labeled 'stuttering' does not occur in a vacuum, independent of the other behavior involved in his speaking.

It is considered important by the writer to place emphasis on the behavior involved in the total process of speaking. Consequently, the 'stutterer' is asked to *describe* what he does as he talks that normal speakers both do and do not do. If, when he is talking, he starts tensing his throat and jaw muscles and hence begins to interfere with the forward flow of speech, it must be recognized that there is no mysterious entity inside of him that is beginning to stop him from talking. Nothing is 'happening!' He is simply beginning to tense his throat and jaw muscles. Moreover, he will stop talking when, for example, he tenses them sufficiently. The things he does which interfere with normal speech production are the things he does that are labeled 'stuttering.' Or, to say it another way: The things he does as he talks are the things he *does* as he talks. Some of these doings of his may interfere with normal speech production, and some may facilitate it. In either event, he does them. They do not just happen!

It is recognized that the so-called 'stutterer' has feelings or emotional reactions about the way he talks or the way he is about to talk. It is unfortunate that these feelings are oftentimes interpreted by him as 'feelings of stuttering.' This implies the existence of a unique, a special feeling which tells him when stuttering is going to 'happen.' Yet, there is no evidence to indicate that these feelings are of a different type from those normal speakers experience. The difference is one of evaluation, not one of type. When he begins to experience an increase of emotion, he begins doing things which interfere with talking. These are done in an effort to head off what he feels to be inevitable, the 'stuttering.' As he stops the forward flow of speech by holding his breath, tensing his jaw muscles, *etc.*, he is *doing* the things he calls 'stuttering.'

The therapy procedures which appear to be most widely employed use the 'stuttering' as the point of reference. The subject is asked to study his stuttering, to change his stuttering, and to control his stuttering. Basic to these procedures is an acceptance on the part of the clinician of the assumption that there exists a unique 'feeling-of-stuttering.' It is usually called 'anticipation.' It should be emphasized that anticipation is not an emotional entity; it is an evaluation of an emotional state or reaction. Yet, the speaker is taught to recognize and to use his 'anticipation' to control the stuttering. He is trained in the belief that when he begins to anticipate

stuttering he will probably stutter, that he should accept this as inevitable, so to speak, and that he should then handle it as calmly and gracefully, or inconspicuously as possible. All too many times this is what is meant, apparently, by learning to be 'objective about one's stuttering.' The speaker is trained, in a sense, to keep his eyes on the stuttering and to work to reduce and minimize it.

From the point of view of the present discussion, it is suggested that the speaker be asked to take his eyes off the stuttering and to look instead toward the total process of talking. There are obvious advantages in looking in the direction in which one is attempting to go instead of continually glancing backward in an effort to work away from something one calls his 'stuttering.' The degree to which one does more things that most speakers do will be the degree that he *does* more things that most speakers do! This, it seems, can be considered a more meaningful use of the term 'improvement.' Certainly it is more meaningful than striving for 'improvement in stuttering.' The goal, then, is not to reduce or to stop something called 'stuttering.' It is to change the way the speaker talks, so that he does more and more things that most people do when they talk.

The preceding discussion represents a relatively basic orientation toward the speech behavior that has been labeled 'stuttering.' The point of view involves, primarily, the assumption that this is a purposeful behavior, something the speaker is *doing*. As such, the things he does can be described, and they can be changed. At the same time, it would be unrealistic to attempt a description of *the* behavior and to present *the* method of retraining. This would imply the assumption that there is an entity of behavior which is the same for all persons and which responds to a stereotyped method of therapy. In this sense, one would merely have substituted the word 'behavior' for the word 'stuttering' and have used it to imply a constant, magical 'thing.' A person's behavior can be described. 'Stuttering,' mystically conceived as an undemonstrable something, cannot be. Each person's behavior varies in observable ways under recognizable conditions. An insensible 'something' designated by the word 'stuttering' does not.

The following is an attempt to indicate, in general terms, a way of talking descriptively about the problem labeled 'stuttering' and to point out certain principles for retraining which have been implied in this discussion. It is apparent that methods of stuttering therapy must be based upon an understanding of principles. It is also readily apparent that principles of therapy are determined by the therapist's orientation and attitudes toward the problem. On the other hand, the methods used in applying these principles are determined to a large extent by the person receiving the therapy. They tend to be personal to him. From the point of view of the present article it would be misleading to attempt a discussion, for example, of methods which are useful in changing the things a person does to interfere with talking, unless the specific things he does are also described.

It is imperative that the person who stutters become aware of what is meant by normal speech. This statement can have meaning for him, of course, only so far as he can arrive at some notion of speech norms by observing persons who are considered to be 'normal speakers.' He should study the ways in which they talk, not only with respect to nonfluency,

but even more pertinently with respect to the general continuity of sound production, a process of moving forward from sound to sound with no holding of breath, with no excessive tension in the throat, jaws, *etc.* Also, he should observe the extreme variability in the fluency, rhythm, rate, *etc.*, of normal speakers. He must come to know this variability as characteristic of the normal, forward-moving speech toward which he is working. Then there can be a purpose in asking him to describe carefully what he is doing as he talks that most speakers do not do. This provides a reference point for comparison, allowing him to describe the things he is doing in terms of similarities and of differences.

From this reference point, it can be observed that while speaking he does not talk spontaneously or smoothly up to the point at which he stops the forward flow of speech. For example, he tends either to pick his way carefully, to 'tip-toe' from one word to the next, as it were, or to talk relatively smoothly and then begin tensing jaw muscles, holding breath, *etc.*, two or three words before the flow of speech is stopped altogether. These ways of talking represent differences from those observed for normal speakers. Furthermore, these differences occur *before* it is usually considered that he has 'begun to stutter.' Clinicians often refer to these differences as 'preliminary movements' while the person who stutters reflects that he is 'merely trying hard not to stutter.' Primarily, however, the things he does consist of a general over-all behavior pattern of 'pulling back,' of 'holding back,' of hesitancy in the general process of speaking.

When the so-called 'stutterer' approaches a word or sound which presents some cue of danger, it is not that suddenly, unrelated to anything else he is doing, some new behavior is exhibited; instead, he continues to behave as he has been, except that now his behavior is intensified. He 'pulls away' harder, thus stopping the forward flow of speech. This he interprets as the 'beginning of stuttering.' He then attempts to stop what he assumes has just begun—and pulls away more; that is, he tenses his jaw muscles more, holds his breath harder, *etc.* This, interestingly enough, is often referred to as 'forcing the word out.' Observationally, it is just the opposite. In 'holding back' harder, he is doing more and more of those things which interfere with making the movements necessary to produce sounds. It is important to observe those ways of speaking as a total behavior pattern instead of viewing them as two dichotomous units, 'speaking' and 'stuttering.' His speaking behavior is a continuous process, a functionally related series of events.

The person who stutters is motivated to govern the things he does as a speaker by the way he feels. It has been pointed out previously that he evaluates his emotional reactions to speaking situations as 'feelings-of-stuttering.' It should be emphasized that the feelings are essentially normal. It is his evaluation or interpretation of them that represents a difference. This evaluation is learned. Following the occurrence of a set of stimuli which he evaluates as 'trouble,' or even 'doubt,' he responds by 'getting set.' He begins to tense his stomach muscles, jaw muscles, *etc.* These responses are interpreted as signals that 'it' is getting closer. In response, he tenses stomach, throat, or jaw muscles more, increases or decreases speaking rate more, restricts the breath flow more, *etc.*, and imagines that 'it' is now beginning. When he reaches this point,

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these are the *results* of his doings, and not the beginning of anything new. Instead, it is a continuation of a comprehensive behavior pattern.

Unfortunately, the person who stutters extends his observation no further than the seeming fact that he 'got the feeling' inside him and in spite of everything he could do to 'stop it,' it was followed by stuttering. These kinds of faulty evaluations provide a powerful conditioning situation, primarily because he never questions the need to respond in the ways he does. Viewed from this orientation, retraining procedures must be based on the principles of change, *i.e.*, changing the things he is doing which interfere with talking. Certainly it is meaningless to base retraining on principles of stopping or controlling an entity called 'stuttering.' Furthermore, the changes should be in the positive direction of doing more things that normal speakers do. These concepts can have meaning only to the degree to which the person learns (1) that nothing will happen *to him*, that is, no entity inside him called 'stuttering' will stop his speech; and (2) that the feeling-of-stuttering is a faulty evaluation of very normal emotional reactions. Then there can be some point in asking him to move forward into speech, to test reality, to do those things which are necessary to talk.

Summary

The speech behavior patterns that have usually been associated with or identified as 'stuttering' vary from person to person, and from time to time with any given person, in many ways. The particular meanings the speaker gives to certain 'feelings' and emotional states tend to vary in similar ways. For the most part, these 'feelings' are highly personal to the individual doing the evaluating. Such variability should prompt the clinician to discontinue talking about stuttering as if it were a vague, undefinable entity within the person and yet as a specific response common to all persons who stutter. Instead, the clinician should learn to deal with each subject by discussing, on a descriptive level, his speech behavior patterns as they vary from those involved in normal speech. It is only through such a procedure that two important functions can be served: first, the clinician can define descriptively an individual's manner of speaking in a way that is understandable both to the clinician and to the person doing the speaking; second, the speaker can describe the specific changes required in order to approach more nearly the ways of talking that are considered 'normal.'

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Book Reviews

SMITH, HENRY L., JR. *Linguistic Science and the Teaching of English.* Cambridge: Harvard University Press, 1956. Pp. 61. $1.50.

This little book, the Inglis Lecture at Harvard for 1954, emphasizes a need which should be felt by many Speech and Hearing Clinics and Departments of Speech. The author, formerly in charge of linguistic training at the Foreign Service Institute of the Department of State in Washington, and now at the University of Buffalo, is one of the leaders in the linguistic scholarship that has been developing so vigorously since the beginning of World War II. Though it is still too early to evaluate many of the results (including the nine-vowel system which Smith favors), the post-war investigations into basic linguistic structure have opened up a tremendously productive field. Speech and Hearing Clinics and Departments of Speech can no more ignore basic linguistics than physicians and surgeons can ignore basic anatomy and physiology. The book is no more than a thumbnail sketch of objectives and methods, but it opens the way to such classics in the field as those of Bloomfield and Sapir, and to such vigorous newer writings as those of Hockett, Nida, Pike, and Smith himself.

C. K. THOMAS

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LIPPMAN, HYMAN S. *Treatment of the Child in Emotional Conflict.* New York: McGraw-Hill Book Company, Inc., 1956. Pp. 297. $6.00.

This book is the outgrowth of the author's twenty-five years of experience in the Amherst H. Wilder Child Guidance Clinic of which he is director. Children's emotional problems are discussed, and theory is combined with application to cases that have been seen at the Clinic. The emphasis is on treatment. Although the author is a child analyst and applies psycho-analytic theory to children's behavior, he is not narrow or dogmatic in this application.

It is felt that this publication is a 'must' for all persons who work with speech defectives. The book presents a very clear, concise analysis of the many types of emotional disturbances with which children are afflicted and often relates them to problems of adults. The cases presented are of the more extreme type which are referred to a guidance clinic. Assuming that the extremes are fundamentally different from 'milder' forms in degree rather than in kind, the speech therapist can also learn a great deal about the 'milder' forms of disturbances which either cause or result from speech deviations. As important as the information in this book is its pattern and spirit. Here is a warm, child-oriented document which presents the best 'team approach' to children's problems that this reviewer has ever read. The approach is dynamic, fluid, and always adaptive as the problems of the child unfold. The approach is realistic, with a frank analysis of problems and limitations which such factors as lack of cooperation of the child, of his parents, or even 'mistakes' of a member of the team may impose. There is no attempt to discuss only successful cases.

This reviewer believes that speech therapists will benefit from sharing with Dr. Lippman the knowledge and understanding which the author's training and experience have given him and which he presents in this book.

ERNEST H. HENRIKSON

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ALLPORT, FLOYD. *Theories of Perception and the Concept of Structure.* New York: John Wiley and Sons, Inc., 1955. Pp. 709. $8.00.

This volume is noteworthy for its content and because of the pre-eminence of its author. Floyd Allport has made significant contributions to the literature of social psychology over the past two decades. Whenever a new book authored by him is published, our understanding of the relationships between people is furthered. In the present volume, he brings his extensive and

Book Reviews is edited by Ernest H. Henrikson, University of Minnesota.

thorough knowledge of psychology, his keen insights and his broad psychological experience to bear on the complex subject of perception. While admittedly not a perceptionist, an experimental psychologist, or a structuralist, he reviews the current theories of perception, some thirteen in number, and summarizes them according to his own concept of structure. This is no lightly undertaken task; it is one that could be done only by someone of Allport's stature. Whether he has succeeded in the process of synthesis or has complicated the field by adding still another theory of perception to the already long list, only time will tell.

The book is necessarily lengthy, even at times rather verbose. If Allport's efforts are to be criticized at all, the criticism would be on the basis of discursiveness. The analyses of current theories are not as clear as they might be because of his tendency to use a well rounded phrase rather than a succinct statement. It is beyond the present reviewer to express Allport's concept in a sentence or two. Suffice it to say that he defines a perceptual act as a dynamically operating structure, self-delimited and self-contained. He presents a working model of the structure of perception and states that all behavioral phenomena follow a law of the type suggested by his model. He offers no proof of his theory, but presents it for experimental verification. He suggests a later volume which will show this testing and the implications of the theory for many fields of science. To those interested in the relationship of structure to behavior, this conceptualization may provide a fundamental approach to perception which, until the present time, has been lacking. The book is not for beginners or novices, but it is an erudite and worthwhile summing up which every student of the perceptual process will want to refer to constantly as he reviews his own concepts of behavior.

JOSEPH M. WEPMAN
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VAN RIPER, CHARLES and GRUBER, LESLIE. *A Casebook in Stuttering.* New York: Harper and Brothers, 1957. Pp. 146. $2.50.

In the training of specialists in all aspects of the field of speech and hearing habilitation, there is no substitute for experience. For that experience to be optimally valuable, it should be organized and evaluated. The authors of this manual have provided the training instructor with a useful outline of training experiences in diagnostic interviewing for use with his students of stuttering. Although the authors' intention is 'to give the beginning student of speech therapy some vicarious experience in examining, diagnosing and planning therapy for a severe secondary stutterer,' the best use of the manual may be as a guide to the instructor in suggesting ways of arranging real experiences in diagnosis and interview for his students.

The manual suggests a sequence of diagnostic procedures including the initial interview, the case history, the autobiography, a test of attitude toward stuttering, an inventory of the stutterer's experience with stuttering, personality tests, situational speech tests, a test of aspiration level, tests of motor skills and of breathing abnormalities, and an analysis of stuttering symptoms. Each of these aspects of the examining and diagnosing process is described in detail in the casebook style of Van Riper's earlier *A Casebook in Speech Therapy*. Practical discussions of interviewing techniques and the implications of the recommended tests are presented as part of the story of the client whose 'case' is reviewed in the college clinic.

Those who are acquainted with the type of stuttering therapy developed in midwestern colleges and universities will find a few familiar principles of stuttering therapy sprinkled through the manual as part of the dialogue of a class in speech correction.

The reader may wish that Van Riper had included more of his knowledge of stuttering therapy. The manual falls short of its intended goal in failing to provide information for planning stuttering therapy. However, there is no question but that it is recommended reading for all students of stuttering. It is particularly valuable as a resource book for the instructor and as a complement to the diagnostic manual of Johnson, Darley and Spriestersbach. The reader will welcome this addition to Van Riper's contributions to the field of speech habilitation.

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O'SULLIVAN, EAMON N. M. *Textbook of Occupational Therapy*. New York: Philosophical Library, Inc., 1955. Pp. 293. $10.00.

This book attempts to stimulate further interest in occupational therapy. Occupational therapy was used in hospitals over 100 years ago, but its scientific development and use as a form of treatment is quite

recent. The role of the occupational therapist is described as primarily one of selecting, under medical prescription, suitable activities which will help to meet a patient's physical and mental needs. The author stresses that the occupational therapist should be aware of the patient's competence and interest in prescribed activities. The activity used as a treatment medium must be judged by its effect upon the individual and not upon the quality of his workmanship. For these reasons, there is a great need for professionally trained therapists possessing technical and scientific knowledge and personal qualities suitable for achieving a working relationship with a patient in the therapy situation.

The author describes the varied types of occupational therapy in terms of handicraft, recreational, and re-educational or habit training programs. The scope of each program is discussed in relation to its suitability to individual or group therapy programs and its utility in hospital wards, bedside treatment programs, and occupational therapy shops.

The final seven chapters of the book are devoted to an analysis of the crafts or activities used as treatment media in occupational therapy. The crafts are discussed in terms of their therapeutic value, complexity, adaptability to various disabilities, utility, and quality. In conclusion, the author stresses again that the mental and physical condition of the patient has immediate bearing on the selection of the craft activity and that the curative value of the craft is dependent upon the type of patient, the duration of treatment, and the occupational therapist's knowledge and understanding of the patient.

Specialists in speech correction will find this book valuable from two main points of view: (1) it presents a discussion of many concepts that have application in their own field; and (2) they will understand occupational therapy better and be able to cooperate more effectively with rehabilitation team members who work in that speciality.

MARILYN FAKLER
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AYER, A. J. *Studies in Communication.* New Jersey: Essential Books, Inc., 1955. Pp. 182. $3.40.

This volume is a compilation of papers based on a series of lectures given in the first year of operation of the Communication Research Centre at University College, London. The papers were prepared by such specialists and authorities as: A. J. Ayer, J. B. S. Haldane, Colin Cherry, Sir Geoffery Vickers, J. Z. Young, R. Wittkower, T. B. L. Webster, D. B. Fry, and Randolph Quirk. The scope of the volume is indicated by some of the titles of the papers: What Is Communication, Communication in Biology, Communication Theory and Human Behavior, Communication in Economic Systems, The Influence of Language on Medicine, Interpretation of Visual Symbols in Art, Communication and Thought in Ancient Greece, The Experimental Study of Speech, and Colloquial English and Communication.

In the main, the papers reflect the fact that they were initially lectures designed to acquaint a diverse audience and the personnel of the Centre with the study of specialized fields from a communications-centered framework. The word 'studies' in the title is somewhat misleading because the papers are not reports of experimental studies, but are essays, summaries, and expositions of the thinking of scientists on communication in the various specialized areas. Generally, little reference is made to communications research in America.

The selections most relevant to the speech and hearing area are: Communication Theory and Human Behavior, and Experimental Study of Speech. Cherry sketches the chief concepts of Communication Theory, and Fry reviews recent studies which exemplify the variety of ways speech can be studied experimentally. The selections entitled: Colloquial English and Communication, and The Influence of Language on Medicine also have relevance to speech pathology. The other selections were of interest to this reviewer from the viewpoint of what some of Britain's authorities think about the problem of communication in their various specialties.

This volume is the first yield of the Communication Research Centre, and it is indicated in the introduction that other volumes reporting cooperative experimental research at the Centre will be forthcoming. These future volumes may be of greater interest and value to persons in the field of speech pathology.

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Abstracts

Agnosia

ETTLINGER, G. Sensory deficits in visual agnosia. *J. Neurol. Neurosurg. Psychiat.*, 19, 1956, 297-307.

In order to test the concept that visual agnosia is a circumscribed defect of recognition or secondary to sensory impairment, language impairment, or general intellectual loss, the author tested 30 brain impaired patients to determine the extent and significance of visual deficit. The tests used were: brightness discrimination, flicker fusion, acuity for small objects, local adaptation, tachistoscopic acuity, and apparent movement perception. Results did not support the view that agnosia is secondary to deficits of visual sensory discrimination but did confirm the view that bilateral visual discrimination defects may follow unilateral cerebral lesions.

(*V. B. Carroll*)

Aphasia

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MANNING, M. E. The assessment and treatment of dysphasia in childhood. *Speech*, 20, 1956, 58-62.

MARKS, M., TAYLOR, M. and RUSK, H. Rehabilitation of the aphasic patient: a survey of three years' experience in a rehabilitative setting. *Arch. phys. Med.*, 38, 1957, 219-226.

An attempt was made to evaluate the success of speech rehabilitative procedures as used with 205 aphasic patients. In terms of speech improvement, the results of the procedures were described as excellent, good, fair or poor. The number of patients falling into each category was determined and each category was further broken down into various aphasic types. According to the authors, 'The results obtained, although not as favorable as those reported by others whose patients had aphasia primarily resulting from trauma, appear to be of significance and warrant a re-education regimen for the aphasic.'

(*J. L. Shapley*)

Attitudes of Speech Defectives

HOROWITZ, L. W. Attitudes of speech defectives toward humor based on speech defects. *Speech Monographs*, 24, 1957, 46-55.

Articulatory defectives, stutterers, and controls were compared on the basis of

Abstracts is edited by William Tiffany, University of Washington, assisted by the following committee: Robert W. Albright, North Dakota Agricultural College; Asa J. Berlin, Pennsylvania State University; Virginia B. Carroll, Minneapolis Veterans Hospital; Alfredo Dub, Hospital Maciel, Montevideo, Uruguay; Emil Froeschels, New York City; Robert Goldstein, Central Institute; A. Bruce Graham, Henry Ford Hospital, Detroit; Morris Halle, M.I.T.; Clair N. Hanley, University of Washington; Dominic A. LaRusso, University of Washington; John J. O'Neill, Ohio State University; John M. Palmer, University of Washington; Maryjane Rees, Sacramento State College; Frank B. Robinson, Miami University; Vivian I. Roe, University of Indiana; Bernard B. Schlanger, Vineland (N. J.) Training School; James L. Shapley, State University of Iowa; Joseph G. Sheehan, University of California; Adam J. Sortini, The Children's Medical Center; Barbara S. Street, Minneapolis Veterans Hospital; Wayne L. Thurman, Eastern Illinois State Teachers College; John C. Webster, USN Electronics Lab., San Diego; Deso Weiss, New York City; Dean E. Williams, Indiana University; Phillip A. Yantis, University of Michigan; Abraham Zaliouk, Haifa, Israel.

their reactions to a group of 45 jokes. One-third of the jokes had reference to speech defects, one-third to visual, hearing, or orthopedic defects, and one-third to innocuous subject matter. The principal conclusion was that the three groups of subjects did not differ significantly from each other in their ratings of the over-all humor of the jokes.

(*D. E. Williams*)

Audio Equipment

BLACK, R. D. Ear-insert microphone. *J. acoust. Soc. Amer.*, 29, 1957, 260-264.

IVES, R. L. Music pulse analyzer rejects voice signals. *Electronics*, 30, (4), 1957, 183-185.

RUTHERFORD, C. R. Instantaneous speech compressor. *Electronics*, 30 (2), 1957, 168-169.

The maximum range of air-to-ground communications systems is said to be extended up to 100 per cent by the use of a speech compressor which combines the advantages of the clipper and the automatic gain control types.

(*C. N. Hanley*)

Audiometry

ALBRITE, J. P., BUTLER, R. A. and GALLOWAY, F. T. The cochleopalpebral reflex in normal hearing and hard of hearing persons. *Arch. Otolaryng., Chicago*, 64, 1956, 402-408.

The intensity of sounds necessary to elicit the cochleopalpebral reflex in normal and hard of hearing subjects was measured, with four pure tones (500, 1000, 2000, and 4000 cps) used as the auditory stimuli. 'The results indicated that the eyeblink response test can differentiate between the normal hearing and the perceptively deafened groups. Moreover, both of these groups can be distinguished from the conductively deafened group on the basis of this test. It is suggested that the cochleopalpebral reflex might be useful as an indirect measure of recruitment, and the objectivity inherent in its measurement contributes to the value of the testing technique.'

(*W. R. Tiffany*)

ALLISON, R. E. Audiometers and their use. *Noise Control*, 3 (2), 1957, 40-43, 90.

The author briefly describes the components and uses of the audiometer in the following categories: screening and group testing, automatic audiometry, speech testing and diagnostic audiometry.

(*P. A. Yantis*)

CORSO, J. F. Confirmation of the normal threshold for speech on C.I.D. Auditory Test W-2. *J. acoust. Soc. Amer.*, 29, 1957, 368-370.

'The present study was undertaken to determine the threshold for speech intelligibility for normal ears on the Central Institute for the Deaf (C.I.D.) Auditory Test W-2. Data were collected on both right and left ears of 139 subjects, ages 18 to 24 years inclusive, showing negative otological findings, a maximal pure tone hearing loss of 5 db at 500, 1000, or 2000 cps, and a history of minimal noise exposure. The obtained mean threshold for speech, for all ears combined (N=278), was 18.55 db *re* 0.0002 dyne/cm^2, with a standard deviation of 4.46 db. These results confirm the normal value for the threshold of intelligibility for the spondaic words of C.I.D. Auditory Test W-2.'

(*Author's precis*)

COX, J. R., BENSON, R. W. and NIEMOELLER, A. F. A mobile laboratory for group hearing tests. *Noise Control*, 3 (2), 1957, 44-48, 92.

GERSUNI, G. V. Concerning new methods of the measurement of hearing in man. *J. acoust. Soc. Amer.*, 29, 1957, 129-131.

The following conditioned responses were studied with respect to obtaining absolute auditory thresholds: galvanic skin response, eyelid reflex, alpha-rhythm depression on the EEG, and oculomotor reactions. Comparing data obtained by these methods with those derived through conventional psychophysical methods, the author found that '(1) absolute auditory threshold and difference limens for frequency and intensity of pure tones can be measured with the same accuracy by these reactions as by verbal responses; (2) in certain cases conditioned reflexes subliminal to the verbal response in the range of 1 to 6 db may be

detected; (3) changes of absolute sensitivity, attaining 25 to 30 db and dependent on the conditions under which the reactions take place, can be detected.'

(*P. A. Yantis*)

WARD, W. D. Method of 'single descent' in group audiometry. *J. acoust. Soc. Amer.*, 29, 1957, 371-376.

'Various methods for determining threshold in a group testing situation were compared. No significant differences in reliability were found between the method of adjustment (either direct or indirect) and the method of "single descent," in which the listener presses a button "just when the beeps disappear." However, the method of single descent is independent of individual differences in adjustment time and requires less apparatus. Thresholds determined by single descent were affected only slightly by rate of descent, starting level and practice factors. A comparison between single descent and the standard clinical technique showed the thresholds to be valid. Field performance of the method, in a 10-man group audiometer, has fulfilled expectations from the pilot studies.'

(*Author's precis*)

Auditory Adaptation

JERGER, J. F. Auditory adaptation. *J. acoust. Soc. Amer.*, 29, 1957, 357-363.

Forty-two combinations of seven frequencies (125 to 8000 cps) and seven intensities (30-90 db re .0002 microbar) were employed in an investigation of auditory adaptation, using a loudness balance technique. In general, the following conclusions were reached: (1) high frequencies seem to show more adaptation than low frequencies; (2) adaptation increases with intensity; (3) maximum adaptation as a function of duration seems to be dependent on frequency and intensity, with a longer duration for higher frequencies; and (4) between-subject variability is great and seems to increase as a function of sensation level.

(*P. A. Yantis*)

Auditory Fatigue

EPSTEIN, A. and SCHUBERT, E. D. Reversible auditory fatigue resulting from exposure to a pure tone. Part I. *Arch. Otolaryng., Chicago*, 65, 1957, 174-182.

'The results of Part I of this study indicate a sensation level of 80 db as approximating a critical fatiguing level for a three-minute exposure to a tone of 4000 cps for the following reasons: (a) Sensation levels of the 4000 cps exposure tone greater than 80 db appear to produce a significant change in the fatigue pattern as delineated by amount of threshold shift and recruitment factor. (b) For stimulating tone levels greater than 80 db, the frequency of maximal fatigue shifts from one-fourth to one-half octave above the stimulating tone frequency.'

(*Authors' precis*)

Auditory Sensitization

HUGHES, J. R. and ROSENBLITH, W. A. Electrophysiological evidence for auditory sensitization. *J. acoust. Soc. Amer.*, 29, 1957, 275-280.

Electrical responses from the round window of the cat were studied in an attempt to explain physiologically the phenomenon of 'auditory sensitization,' which has been observed psychophysically as a lowering of absolute threshold for pure tones after low-tone exposure. It was found that, after relatively intense low-tone exposure, the first neural response showed an initial decreased response, then an increased response (sensitization), and then a second subnormal response. It is felt that this sensitization effect may be related to the increased responsiveness of the nervous system after application of a tetanizing stimulus and probably occurs at the hair cell-VIII nerve junction in the organ of Corti.

(*P. A. Yantis*)

Auditory Threshold

MCPHERSON, R. R. and BIRDSALL, T. G. Auditory threshold. *J. acoust. Soc. Amer.*, 29, 1957, 393-394.

THURLOW, W. R. and BOWMAN, R. Threshold for thermal noise as a function of duration and interruption rate. *J. acoust. Soc. Amer.*, 29, 1957, 281-283.

'Experiments are reported on temporal summation at threshold for thermal noise. Durations from 1 to 850 msec and repetition rates from 1 to 100 per sec were used.

Results show that threshold decreases as a function of duration for all repetition rates. Thresholds also decrease as a function of repetition rate, though the effect of repetition rate is not so marked as that of duration, and becomes even less so at long duration.'

(*Authors' precis*)

Aural Overload

LAWRENCE, M. and YANTIS, P. A. Overstimulation, fatigue, and onset of overload in the normal human ear. *J. acoust. Soc. Amer.*, 29, 1957, 265-274.

'Studies on the effect of overstimulation upon the ear have been handicapped by lack of an audiometric procedure known to detect subtle changes in the organ of Corti. Fatigue has often been suggested and used but studies of the cochlear potentials associated with low-intensity vibration of the organ of Corti have never revealed such fatigue, which must arise from more central structures. Fatigue following high levels of sound intensity is probably a sum of "neural" fatigue and an injury to the organ of Corti. On the other hand, such studies have shown aural overload to result from an overdriving of the organ of Corti beginning at an intensity of sound considerably below that which is injurious.

'The experiments reported here compare the shift in audibility threshold and in onset of overload following one-minute stimulations with a 1000-cps tone at sensation levels of 20, 60, 80, 90, 100, and 110 db. The amount of post-stimulus fatigue measured 6 seconds after cessation of the fatiguing tone showed little variation with intensity of fatiguing tone whereas the onset of overload, when compensation was made for fatigue of the harmonic frequency, showed a progressive lowering with increase of intensity of fatigue tone.

'It is concluded that within the limitations of these experimental conditions the fatigue measured is not a property of the sensory cells whose sensitivity does not change until an injurious level of tone is reached, but that overloading is a property of these cells and the lowering of its onset level reflects an increasing decrement in performance following increasing intensities of stimulation.'

(*Authors' precis*)

Brain Damage

EISENBERG, L. Psychiatric implications of brain-damage in children. *Psychiat. Quart.*, 31, 1957, 72-89.

The following behavior patterns that frequently occur with brain-damaged children are discussed: (1) hyperkinesis; (2) distractibility; (3) emotional lability; (4) antisocial behavior; (5) intellectual deterioration; and (6) acute anxiety. Neurophysiological considerations which partially account for this behavior, and psychosocial factors important to the child's total adjustment are discussed.

(*B. S. Street*)

GOODALL, R. J. Cerebral hemispherectomy—present status and clinical indications. *Neurology*, 7, 1957, 151-162.

GRAHAM, F. K. Behavioral differences between normal and traumatized newborns: I. The test procedures. *Psychol. Monogr.*, 70, (20), 1956, 1-16.

Five test procedures developed to provide a means of differentiating normal newborns from those who have been traumatized and possibly brain-injured are described. These were developed in the hope that differences in initial response to trauma might aid in predicting the course of subsequent development. The five tests consist of a Pain Threshold Test, a Maturation Scale, an Irritability Rating and a Muscle Tension Rating.

(*J. G. Sheehan*)

GRAHAM, F. K., MATARAZZO, R. G. and CALDWELL, B. M. Behavioral differences between normal and traumatized newborns: II. Standardization, reliability, and validity. *Psychol. Monogr.*, 70 (21), 1956, 17-33.

PAGE, H. A., KAPLAN, H. K. and SMITH, N. B. Another application of the spiral aftereffect in the determination of brain damage. *J. consult. Psychol.*, 21, 1957, 89-91.

A previous study reported by Price and Deubler stated that brain-damaged patients were unable to perceive a spiral aftereffect which non-brain-damaged individuals perceived with the Archimedes Spiral. In order further to investigate this phenomenon, the authors studied twenty patients with known brain-damage and a control group of twenty psychotic patients. Although significant dif-

ferences were obtained between the two groups, some organic patients were able to perceive the spiral aftereffect.

(*B. S. Street*)

Broncho-Esophagology

Annales d'oto-laryngologie, Paris, 73, 1956, 633-786.

This issue is devoted to broncho-esophagology. The volume covers a wide range of medical aspects of pulmonary disease: tracheotomy, endoscopy, tomography, cinematography, stenosis of the airways, bronchial tuberculosis in children, *etc.* There are also reports of advances in the use of cinematography and TV in examination and instruction in broncho-esophagology.

(*R. W. Albright*)

Cerebral Dominance

ETTLINGER, G., JACKSON, C. V. and ZANGWILL, O. L. Cerebral dominance in sinistrals. *Brain*, 79, 1956, 569-588.

The problem of cerebral dominance of sinistrals is reviewed in the light of recent studies. Ten cases of exclusively or predominantly unilateral brain disease in left-handed patients are reported and the findings analysed with special reference to the hypothesis of bilateral speech representation in left-handed individuals. The lesions were found to be left-sided in eight of the ten cases. Seven of the eight patients with left-sided lesions showed dysphasic signs, and disorders of praxis and body-scheme were present in three patients with involvement of the left parietal lobe. There was a persisting dysphasia in one of the two patients with a right-sided lesion. The authors conclude that whereas some degree of cerebral ambilaterality may exist in a certain proportion of cases, unilateral representation of speech (usually left, but occasionally right) is the most prevalent form of cerebral organizations in sinistrals.

(*B. S. Street*)

GIRARD, F. Latéralisation cérébrale et correction des troubles neurologiques et psychiatriques fonctionnels. (Cerebral lateralization and correction of functional neurologic aand psychiatric troubles.) *Rev. Laryng., Bord.*, Supplement, May 1956, 459-467.

Cerebral Palsy

SHERE, M. O. The socio-emotional development of the twin who has cerebral palsy. *Cerebral Palsy Rev.*, 17 (1), 1957, 16-18.

Using the Fels Appraisal of Parent Behavior, the Fels Child Behavior Scale, and the Vineland, the author studied thirty twin pairs between the ages of 18 months and 16 years. Their families were also included in the study. One twin in each pair had cerebral palsy, the other did not. The purpose of the study was to answer two questions: (1) does the behavior of parents toward their cerebral palsied child differ significantly from their behavior toward their other children, and (2) does the behavior of a cerebral palsied child differ significantly from that of his twin not so afflicted? The results of the investigation indicate that the first question should be answered with a qualified 'no', and the second with a qualified 'yes.'

(*J. L. Shapley*)

Child Development

BERLYNE, D. E. Recent developments in Piaget's work. *Brit. J. educ. Psychol.*, 27, 1957, 1-12.

A survey and evaluation of the contributions of Piaget to child development is presented. His recent research on differences between perceptual and conceptual processes is emphasized.

(*F. B. Robinson*)

Cleft Palate

CONWAY, H. Interpretation of function of the pharyngeal flap during speech. *Cleft Palate Bull.*, 6 (4), 1956, 4-5.

A surgical procedure is outlined which combines a retrodisplacement of the mucoperiosteum of the hard palate and the tissues of the soft palate with an inferiorly based flap of posterior pharyngeal mucosa and musculature. This surgical measure maintains operative retrodisplacement of the palate and is said to help velo-pharyngeal closure in several ways. This procedure was used with 81 cases who had previously had surgery but could not overcome faulty speech; 79 per cent of these are said to have acceptable speech.

(*A. J. Berlin*)

FRASER, F. C., WALKER, B. E. and TRASLER, D. G. Experimental production of congenital cleft palate: genetic and environmental factors. *Pediatrics*, 19, 1957, 782-787.

Cortisone-induced cleft palate in mice demonstrated that the process of palate closure involves the delicate integration of a number of processes, each under the influence of genetic and environmental factors. These processes include the building up of a force within the palatine shelves which enables them to overcome tongue resistance and meet in the midline, provided the width of the head and the width of the shelves are appropriate. Several ways in which the process of palate closure can go wrong and result in cleft palate are indicated.

(*B. B. Schlanger*)

HASELHUHN, D. H. Pediatric anesthesia for repair of cleft lip and cleft palate. *Cleft Palate Bull.*, 7 (1), 1957, 5-6.

MALSON, T. S. Non-obstructing prosthetic speech aid during growth and orthodontic treatment. *Cleft Palate Bull.*, 6 (4), 1956, 5-8.

A detailed description is given for the construction of a sliding hinge obturator which is designed for minimum interference with orthodontia and maxillary growth. The obturator disk is moved freely by the remnants of velar tissue and little stress is exerted on the holding appliance.

(*A. J. Berlin*)

METZGER, J. T. Consideration of factors in determining the age for closure of congenital palatal clefts. *Cleft Palate Bull.*, 7 (1), 1957, 7-8.

Five types of palatal surgery are described briefly and their potentialities for interference with growth are indicated. Criteria for determination of early (by 12 months) palatal closure are listed.

(*A. J. Berlin*)

Moss, M. L. Dysostosis sphenoidalis as a characteristic of cleft palate malformation. *Cleft Palate Bull.*, 6 (4), 1956, 2-4.

Tracings of the skull base and associated bony structures on lateral skull roentgenograms were measured to determine certain angular relationships for cleft palate and non-cleft individuals. Subjects with all types of cleft palate deformity showed similar significant midline malformations of the skull base.

(*A. J. Berlin*)

RANDALL, P. The management of cleft-lip and cleft-palate patients. *Amer. J. med. Sci.*, 233, 1957, 204-219.

According to the author, the purpose of this paper is '. . . to present a broad picture of management for patients with clefts of the lip and palate, not particularly for those with specialized interest in this field, but rather for doctors who are not so closely associated with these problems.' The function and value of speech training procedures as a part of the over-all management is included.

(*J. L. Shapley*)

WEBSTER, R. C., COFFEY, R. J. and RUSSELL, J. A. Posterior pharyngeal flap palatorrhaphy. *Cleft Palate Bull.*, 7 (1), 1957, 6-7.

This is a description of the surgical procedure in which a Langenbeck mucoperiosteal hard palate cleft closure was combined with the pharyngeal flap procedure.

(*A. J. Berlin*)

Congenital Defects

RISTAU, W. Mikrogenie mit glossoptose und stridor congenitus. (Microgeny and glossoptosis and congenital stridor.) *HNO. Berlin*, 6, 1957, 97-100.

Two babies, the one 7 weeks, the other 8 days old, showed signs of a life-threatening inspiratory stridor. In both cases the lower jaw was very small (microgeny), and both had a cleft palate with the tongue lying far back in the mouth. By strong forward pulling of the lower jaw the attacks of suffocation could be fought. After a few weeks the jaw and the tongue had grown sufficiently and the attacks of dyspnea disappeared. A thorough discussion of the literature concerning similar cases and of the theories about the reasons for the underdevelopment of the jaw and tongue is presented. Also the relationship of the frequent coincidence of cleft palate and microglossia is discussed.

(*E. Froeschels*)

Congenital Facial Malformations

McCoy, F. J. Congenital malformations of the face. *Cleft Palate Bull.*, 6 (4), 1956, 8-10.

Some mechanisms for the occurrence of congenital malformations of the face are described, including specific circulatory defects, formation of fibrous bands, and inhibitory influences at specific stages of fetal development.

(*A. J. Berlin*)

Delayed Speech

Wood, N. E. Causal factors of delayed speech and language development. *Amer. J. ment. Def.*, 61, 1957, 706-708.

Twelve hundred children between the ages of three and six years who were severely delayed in speech and language development were classified on the basis of case history information. Follow-up evaluations were made on 348 unclassifiable children whose primary problem could have been diagnosed as mental retardation. However, other factors were indicated as the true cause of the delayed speech. This was said to suggest that a coordinated testing program is needed to differentiate causal factors in severely delayed speech development.

(*B. B. Schlanger*)

Earmolds

Ewertsen, H. W. and Nielsen, M. Soft earmould. *Acta Otolaryng.*, 47, 1957, 231-232.

The authors report evidence that, in cases of severe hearing losses, a soft earmold has some distinct advantages over the hard mold usually employed. Acoustic feedback is said to be minimized, allergic reactions are not as common, and the probability of injuries to the external ear canal as a result of falls or blows is reduced. The procedure for making soft molds is described in detail.

(*D. A. LaRusso*)

Ear Pathology and Surgery

Carhart, R. and Shambaugh, G. E. The effect of ointment prosthesis on fenestrated ears. *Arch. Otolaryng., Chicago*, 65, 1957, 161-173.

'A controlled statistical study of the effect of ointment prosthesis on the fenestrated ear confirms the value of this procedure for enhancing the hearing improvement following successful surgery. As a result of this technique, the minimal conductive deficit to be expected following fenestration is nearer to 15 db for the speech frequencies than the 20 db indicated by Davis and Walsh and confirmed by McConnell and Carhart.'

(*Authors' precis*)

Engler, W. Treatment of tinnitus. *J. Amer. med. Ass.*, 163, 1957, 615-616.

Two types of tinnitus are recognized, the 'vibratory or objective' type and the 'nonvibratory or subjective type.' A number of known causes are listed. Therapy is discussed for tinnitus caused by old age or middle ear involvement. Management of the neural degeneration type includes explanations to the patient, assistance in adjusting to the noise, and reassurance.

(*W. L. Thurman*)

Fowler, E. P. Otosclerosis. An index of the literature, with abstracts, and an index of the authors according to subjects for 1954-1955. *Arch. Otolaryng., Chicago*, 65, 1957, 116-132.

Goto, S. Present tympanoplastic surgery. *Acta Otolaryng.*, 47, 1957, 105-113.

Otitis media of a chronic suppurative nature can, in the opinion of the investigator, be treated most effectively by various methods of tympanoplastic surgery. The author details specific operative procedures to be employed for various standard conditions. He concludes that the results accrued from the treatment of 162 cases support the assertion that such surgery can improve hearing as much as 30 db.

(*D. A. LaRusso*)

Gurria, A. B. and Deutsch, L. Congenital atresia of the middle and external ear. *Arch. Otolaryng., Chicago*, 65, 1957, 349-355.

Hood, J. D. Auditory fatigue and adaptation in the differential diagnosis of end-organ disease. *Trans. Amer. otol. Soc.*, 43, 1955, 81-92.

HOUSE, H. P. Personal experiences with stapes mobilization. *Arch. Otolaryng., Chicago, 65*, 1957, 235-244.

The author presents a detailed description of his own surgical procedure in stapes mobilization with a discussion of surgical complications, indications for mobilization procedure, and results.

(*J. M. Palmer*)

KOS, C. M. Conservation of hearing—fenestration or stapes mobilization. *J. Amer. med. Ass.*, 167, 1957, 814-817.

The place of the stapes mobilization procedure in otosurgery is discussed. Fenestration and stapes mobilization are described as complementary procedures, each being useful for certain hearing loss situations. They are compared with respect to techniques, aftereffects, and complications. A report is made of results of 400 operations for mobilization of the stapes.

(*W. L. Thurman*)

MEURMAN, O. H. Determination of the degree of stapedial fixation with an acoustic probe in otosclerosis. *Acta Otolaryng.*, 47, 1957, 141-148.

'This work was undertaken for the purpose of studying the degree of fixation of the stapes by taking audiograms with an acoustic probe from the malleus handle and comparing the relative hearing loss indicated by the resulting curve with that shown in the air conduction audiogram. The general observation was that the better the ossicle curve and the smaller the relative hearing loss indicated by this curve, the slighter was the degree of fixation and the easier the mobilization of the stapes. The results showed clearly that the relative hearing loss by the ossicle curve was not consistent with that indicated by the air conduction audiogram.'

(*D. A. LaRusso*)

MÖLLER, F. and NENZELIUS, C. An accumulation of cases of neurogenous hearing impairment. *Acta Otolaryng.*, 47, 1957, 158-166.

'Eleven cases of one-sided neurogenous hearing impairment are described. They are interpreted as manifestations of an epidemic brain-stem encephalitis.'

(*D. A. LaRusso*)

OPHEIM, O. and FLOTTORP, G. Ménière's disease. *Acta Otolaryng.*, 47, 1957, 202-218.

The authors present the view that recent experimentation tends to support some of Ménière's original beliefs. It has been found that: (1) reduced hearing and tinnitus are standard symptoms in the disease; (2) the hearing loss generally hovers in the auditory field below 2000-3000 cps; (3) great fluctuations in hearing loss (even in the range below 2000-3000 cps) are not uncommon; (3) recruitment attends all hearing losses which do not approach total deafness; and (4) intolerance and disturbed pitch perception are also commonly found in an accurate diagnosis of this disease. These findings are said to support the belief that many cases diagnosed as acute cryptogenetic hypo-anacusis are variations of Ménière's disease.

(*D. A. LaRusso*)

PERMIN, P. M. and POULSEN, H. Ménière's disease. *Acta Otolaryng.*, 47, 1957, 219-230.

ROSEN, S. Fenestration of the oval window for increasing sound conduction to the cochlea. *Arch. Otolaryng., Chicago, 65*, 1957, 217-220.

SAMTER, M. Use of hormones in treatment of otolaryngologic disease. *J. Amer. med. Ass.*, 163, 1957, 613-615.

SVANE-KNUDSEN, V. Sudden 'spontaneous' lesion of aural function. *Acta Otolaryng.*, 47, 1957, 270-282.

VASILIU, D. J. Apropos de quelques cas d'oreillons. Les oreillons chez le vieillard. La surdité ourlienne. (Concerning several cases of mumps. Mumps in an aged man. Deafness resulting from mumps.) *Rev. Laryng., Bord.*, 77, 1956, 537-545.

After describing a case of mumps in an 80 year-old man, the author propounds a theory for the cause of deafness as a result of mumps. Instead of the auditory nerve, the stria vascularis is thought to be attacked and with its destruction or degeneration there is no longer normal production or circulation of endolymph. Consequently the sensory structures of the organ of Corti are no longer nourished properly and thus degenerate. The vestibular system is not affected because it has a source of en-

dolymph different from that of the cochlea.

(*R. Goldstein*)

WULLSTEIN, H. Les principes de la chirurgie fonctionnelle de l'oreille. (Principles of functional surgery of the ear.) *Rev. Laryng., Bord.*, 77, 1956, 497-507.

Surgery to improve hearing involves various tympanoplastic reconstructions as well as fenestration and stapes-mobilization. Restoration of the impedance-matching and leverage functions of the tympanic membrane and of the ossicular chain can, theoretically and practically, restore normal auditory sensitivity. Even with permanent impairment of middle ear structures, conductive-type hearing losses can be reduced to less than 30 db with proper micro-surgical techniques.

(*R. Goldstein*)

Ear Physiology

RAHM, W. E. JR., STROTHER, W. F., and CRUMP, J. F. The effects of pressure in the external auditory meatus. *Ann. Otol., etc., St. Louis*, 65, 1956, 656-664.

'An increase in pressure in the external meatus has a marked effect upon the electrical responses of cochlea. For certain tones a small degree of pressure produces a slight improvement but large pressures always cause a reduction in the responses. Generally speaking, low tones are more affected than high tones, but the relation is not exactly in the order of frequency. The principal effects are upon the drum membrane and are attributable to changes in its tension.'

(*Authors' summary*)

Esophageal Speech

BECK, J. La voix oesophagienne de remplacement des laryngectomisés. (Esophageal voice as a substitute in laryngectomized patients.) *Rev. Laryng., Bord.*, 77, 1956, 728-739.

Theoretical and factual evidence is presented to show that, following laryngectomy, voice is produced with the esophagus as the source of air, and with the vibrations formerly produced by the vocal cords now produced by structures near the top of the esophagus. Spectral analyses are given of vowels produced with esophageal voice.

(*R. Goldstein*)

Facial Paralysis

PAINE, R. S. Facial paralysis in children. *Pediatrics*, 19, 1957, 303-316.

Facial nerve anatomy and the various etiologic factors in both congenital and acquired facial paralysis in children are reviewed. The author discusses differential diagnosis among the more important of these and evaluates possible methods of treatment. The use of cortisone seems to be the most favored treatment at the present time. Results with ten children are used to illustrate the effects of this method.

(*B. B. Schlanger*)

False Band Phonation

RETHI, A. Le système musculaire stylo-pharyngien et la voix des band ventriculaires. (The stylo-pharyngeal muscular system and voice with the ventricular bands.) *Rev. Laryng., Bord.*, Supplement, May 1956, 473-475.

When the vocal bands are fixed to the side following remedial surgery there is a readjustment of the pharyngeal and laryngeal muscles and mucosa which permits phonation mainly through vibrations of ventricular bands or 'false cords.' Hypertrophy of the stylo-pharyngeal muscle is the principal factor in this readjustment.

(*R. Goldstein*)

Frequency Transposed Speech

BROADBENT, D. E. The bass cutting of frequency transposed speech. Applied Phys. Res. Unit (Cambridge, England), Rep. 203/56, April, 1956.

PB word intelligibility scores for speech transposed in frequency by -300, -200, 0, 200 and 300 cps and with 0, 440, and 660 cps bass cutting (high pass filtering) were determined by groups of 10 listeners. Tests were given for (1) speech in noise, (2) faint speech, (3) loud, clear speech while the subjects performed a visual task and (4) condition 3 with digits instead of PB words. Results indicate that high-passed speech suffers less than all-passed speech for positive transpositions, that negative transpositions are bad for any band of speech, and

that intelligibility tests should be supplemented by simultaneous tasks to evaluate best the effectiveness of speech systems.

(*J. C. Webster*)

Galvanic Skin Response

SCHNEIDER, R. A. and COSTILOE, J. P. Effect of centrally active drugs on conditioning in man: the inhibiting and facilitating effects of chlorpromazine, amobarbital and methylphenidylacetate on the conditioned galvanic skin response. *Amer. J. med. Sci.*, 233, 1957, 418-423.

The effects of depressant and stimulant drugs upon the GSR was investigated. Forty subjects were divided into one 'control' and three 'drug' groups. In all groups the GSR was conditioned, extinguished and reconditioned 24 hours later. Tests of the significance of the inhibiting and facilitating effects of the drugs on the GSR are summarized.

(*J. L. Shapley*)

Group Therapy

CORSINI, R. J. and PUTZEY, L. J. Bibliography of group psychotherapy. *Group Psychother.*, 9, 1956, 178-249.

DREIKURS, R. The contribution of group psychotherapy to psychiatry. *Group Psychother.*, 9, 1956, 115-225.

KADIS, A. L. The alternate meeting in group psychotherapy. *Amer J. Psychother.*, 10, 1956, 275-291.

The author discusses the practice of asking each group to hold alternate meetings regularly without the therapist. Patients are encouraged to continue the group analytic process in the same manner as in the regular meetings. Alternation of hierarchical and peer relations, leading to ever-increasing freedom of expression and ego strength, is seen as being of major value in the alternate session.

(*J. G. Sheehan*)

SHERWOOD, C. S. Some recommendations for research in the field of group psychotherapy. *Group Psychother.*, 9, 1956, 126-132.

Hearing Aids

PATTEE, G. L. and CARY, L. A. The use and abuse of hearing aids. *Arch. Otolaryng., Chicago*, 65, 1957, 269-274.

The authors present a plea for routine auditory training following hearing aid requisition. The success of such training is illustrated by the experiences of identical twins, the one satisfactorily wearing an aid, the other not.

(*J. M. Palmer*)

Hearing Loss

MASPÉTIOL, A. and SEMETTE, D. Les surdités des aviateurs et leurs conséquences professionnelles. (Two types of aviation deafness and their professional consequences.) *Annales d'oto-laryngologie*, Paris, 73, 1956, 799-811.

The authors emphasize the shortcomings of pure-tone audiometry for estimating the ability of aviators to perceive speech under the conditions of wearing a helmet and headphones in the presence of noise. Under these conditions, they found that aviators with some hearing loss perceived speech better than normals. Their conclusion is that speech-audiometry, not pure-tone audiometry alone, should be used in evaluating aviators' ability to understand amplified speech.

(*R. W. Albright*)

ROACH, R. E. The hearing-impaired child in your class. *Instructor*, 66, 1957, 39, 69-70.

Advice is given to the classroom teacher with regard to the recognition and handling of the hard of hearing child.

(*B. B. Schlanger*)

Hemiplegia

MACKMULL, G. Hope and help for the hemiplegic. *Clin. med.*, 4 (1), 1957, 33-36.

Physical and drug therapy for the adult hemiplegic are briefly outlined. The author feels that an active rehabilitation program for these cases has a 90% chance to produce self-care within one year, and a 30% chance for useful employment.

(*P. A. Yantis*)

Impedance of the Ear

ZWISLOCKI, J. Some measurements of the impedance at the eardrum. *J. acoust. Soc.*

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Amer., 29, 1957, 349-356.

'Three methods are described for measuring the impedance at the eardrum. Two methods are psychophysical and one is purely physical. Although the physical method seems to be more appropriate for this kind of measurement, all three methods yield comparable results. The final results agree with some of the measurements made in the past on the reactance at the eardrum up to 1000 cps. They disagree on reactance above 1000 cps and on resistance. The new data seem to fit the general picture of sound conduction in the ear better than did values obtained earlier. They could lead to corrections in the coupler cavities used for miniature earphones and in calculations on the sound attenuation afforded by some ear protectors.'

(*Author's precis*)

Information Transmission

PIERCE, J. R. and KARLIN, J. E. Reading rates and the information rate of a human channel. *Bell Syst. tech. J.*, 36, 1957, 497-516.

'The limitation on the rate at which information can be transmitted over an ordinary telephone channel is a human one. In this study, people read words as fast as they were able to, from these results some deductions are made about the capacity of a human being as an information channel. The discrepancy between human channel capacity measured thus (40-50 bits/sec) and telephone and television channel capacity (about 50,000 bits/sec and 50,000,000 bits/sec, respectively) is provocative.'

(*Authors' precis*)

Intelligence of the Deaf

DUTTA, K. A comparative study of intelligence of deaf-mutes and normal hearing students. *Deaf in India*, 88, 1956, 1-28.

Deaf children scored as high as normally hearing children on a performance test (Alexander's Passalong Tests) but scored significantly lower on a verbal test (Wechsler-Bellevue). The author concludes that the deaf have 'concrete intelligence' equal to that of normally hearing children but are inferior to hearing children with respect to 'abstract intelligence.'

(*R. Goldstein*)

Intelligence Testing

CAVANAUGH, M. C., COHEN, I., DUNPHY, D., RINGWALL, E. A. and GOLDBERG, I. D. Prediction from the Cattell Infant Intelligence Scale. *J. consult. Psychol.*, 21, 1957, 33-40.

HALL, J. C. Correlation of a modified form of Raven's Progressive Matrices (1938) with the Wechsler Adult Intelligence Scale. *J. consult. Psychol.*, 21, 1957, 23-26.

LOGAN, K. L. A method of assessing capacity in preschool cerebral palsied children. *J. clin. Psychol.*, 13, 1957, 54-56.

The author has constructed a children's Picture Information Test to be used for the intellectual assessment of preschool cerebral palsied children who are sufficiently handicapped to make usual intelligence testing impossible. The test is a multiple choice selection of 34 sets of items which are primarily within the experience of even the most environmentally restricted child. This test and the Stanford-Binet were given to 50 cerebral palsied children with a resultant correlation of .83 $\pm$ .03. Ten nonhandicapped children were tested with a correlation of .87. In addition, ten children with such severe involvement that normal testing could not be obtained were tested, using the picture test. The range of mental ages obtained suggests a similar one to that found with less severely involved children. No large scale normal population sampling has yet been completed.

(*V. B. Carroll*)

Intelligibility

HOWES, D. On the relation between the intelligibility and frequency of occurrence of English words. *J. acoust. Soc. Amer.*, 29, 1957, 296-305.

Intelligibility tests were given to a panel of 5 college students, using words of known length and frequency of occurrence (in a pre-established criteria), and employing speech-to-noise ratios of -9, -6, 0, $+6$, $+9$, $+12$ and $+20$ db. The over-all SPL of the wide-spectrum noise was held constant at approximately 80 db above .0002 microbar. It was found that the threshold of intelligibility for a word, under these conditions, is a decreasing function of the frequency with which the word occurs in general linguistic usage, and the drop in threshold

seems to be generally independent of the length of the word. The application of these results to intelligibility testing is discussed.

(*P. A. Yantis*)

MASPÈTIOL, A. and SEMETTE, D. La valeur d'intelligibilité des différentes fréquences. (The intelligibility value of different frequencies.) *Annales d'oto-laryngologie*, Paris, 73, 1956, 812-824.

Coefficients of intelligibility for French, based upon an experimental study of 60 normal subjects, were deduced by passing PB lists through filters of 1/3 octave and 1/2 octave for a man's voice, and 1/2 octave for a woman's. General findings were that the upper limit of the speech-frequency range is 3000 cps for the man's, and 3500 cps for the woman's voice. Findings contradicting usual ones were that the optimum zone of intelligibility was between 1200 and 1500 cps, not at 2000 as is often stated, and that the frequencies of 500 to 750 cps were of about equal importance to 2000 cps. The authors discuss certain problems of perception and phonemic classifications and emphasize the inadequacy of pure-tone audiometry for estimating one's disability for speech-hearing.

(*R. W. Albright*)

Labyrinth Physiology

MARCO, J., MORERA, H. and GIMENEZ, J. -A. Étude histophysiologique du labyrinthe de cobayes injectés avec de l'hyaluronidase intrapéritonéale. (Histophysiologic study of the labyrinth of guinea pigs injected intraperitoneally with hyaluronidase.) *Rev. Laryng., Bord.*, 77, 1956, 555-564.

Intraperitoneal injections of hyaluronidase in six guinea pigs produced no measurable alteration of auditory thresholds or of vestibular reactions, nor any significant histologic alteration within the labyrinth. It is inferred that hyaluronidase does affect vascular permeability in the labyrinth of guinea pigs.

(*R. Goldstein*)

Laryngeal Paralysis

ARNOLD, G. E. Vocal rehabilitation of paralytic dysphonia. III. Present concepts of laryngeal paralysis. *Arch. Otolaryng., Chicago*, 65, 1957, 317-336.

'An attempt is made to define the major problems of laryngeal paralysis by analyzing the representative bibliography from the following viewpoints: value and limitations of animal experiments; chronologic changes in the concepts of laryngeal paralysis; discussion of the central pathways and the peripheral course of the laryngeal nerves; distribution of vagal and accessory fibers in the laryngeal nerves; variability of the terminal ramification of the recurrent nerves; and the present interpretation of the position of the paralyzed vocal cords.'

(*Author's summary*)

Laryngeal Pathology and Surgery

BJORK, H. and TEIR, H. Benign and malignant papilloma of the larynx in adults. *Acta Otolaryng.*, 47, 1957, 95-104.

In an attempt to add to the knowledge of benign and malignant laryngeal papilloma, the authors studied 35 cases for a 20 year period. Taken under surveillance at the onset of symptoms, the patients provided much information concerning the nature, course, and final outcome of the disease. The authors conclude that malignancy should be suspected with the presence of laryngeal papilloma, negative clinical notations notwithstanding. The major criterion in determining malignancy is the existence of intraepithelial anaplastic changes.

(*D. A. LaRusso*)

TSCHIASSNY, K. Therapeutically induced paralysis of the cricothyroid muscle or its removal in paralytic laryngeal stenosis. *Arch. Otolaryng., Chicago*, 65, 1957, 133-142.

Laryngeal Physiology

CORABOEUF, E., SAUMONT, R. and GARGOUIL, Y. -M. Étude comparée de l'activité électrique du récurrent du chien et de celle d'autres nerfs de mammifères. (Comparative study of the electric activity of the inferior laryngeal nerve of the dog and that of other nerves in mammals.) *Rev. Laryng., Bord.*, Supplement, May 1956, 445-454.

The inferior laryngeal or recurrent nerve of the dog can respond to periodic electric stimulation with rates at least as high as 700/second. Beyond 250/second, the amplitude of response decreases sharply as frequency increases. Beyond 900/second, the nerve responds to every other stimulus. The electric properties of the recurrent nerve

are similar to those of other mammalian nerves.

(*R. Goldstein*)

CORRION, J., GRIFFIÉ, R. -A., GUOIT G., HOFMANN-SAGUEZ, R. and MOYNIER, R. Réponse de l'endolarynx et plus spécialement des cordes vocales a certaines stimulations percutanées. (Response of the endolarynx and especially of the vocal cords to certain percutaneous stimulations.) *Rev. Laryng., Bord.*, 77, 1956, 632-633.

HOFMANN-SAGUEZ, R., CORRION, J., GRIFFIÉ, R. -A. and MOYNIER, R. Utilisation de l'electrographie laryngée externe dans l'étude de la phonation normale et pathologique. (Utilization of electrography of the external surface of the larynx in the study of normal and pathologic phonation.) *Rev. Laryng., Bord.*, 77, 1956, 627-631.

JESCHEK, J. Sur l'innervation motrice du larynx. (Motor innervation of the larynx.) *Rev. Laryng., Bord.*, Supplement, May 1956, 468-472.

LAGET, P. Appareils et mécanisme phonatoires dans quelques groupes de vertébrés. (Apparatus and mechanism of phonation in some groups of vertebrates. *Rev. Laryng., Bord.*, 77, 1956, 615-626.

After tracing the phylogenetic development of anatomical structures and the mechanisms of phonation among vertebrates, the author suggests that most of the vocalization of all vertebrates except man is controlled primarily at a sub-cortical level.

(*R. Goldstein*)

RUDOLPH, G. Role des influx proprioceptifs issus de la musculature laryngée pendant la phonation. Position du problème. (The role of proprioceptive influx from the muscles of the larynx during phonation. Status of the problem.) *Rev. Laryng., Bord.*, Supplement, May 1956, 434-444.

The existence of proprioceptors in the laryngeal muscles is inferred from histologic and physiologic studies of other investigators. Signals from these proprioceptors supposedly exert some influence on the action of the laryngeal muscles through a feedback system regulated largely by the cerebellum.

(*R. Goldstein*)

Loudness Measurement

SEMEONOFF, B. Measurement of loudness: an addendum. *J. acoust. Soc. Amer.*, 29, 1957, 311-313.

'Some early but hitherto unpublished work on the measurement of loudness is reported, primarily for its relevance to Stevens' recent survey of this subject. Experiments using methods of magnitude estimation and of constant stimuli were carried out with a 512-cps tone from an electrically-driven tuning fork at levels of approximately 60 to 100 db. Fairly marked differences were found between estimates of half and double loudness made by 3 subjects, each of whom showed individual consistency. On the whole, greater decibel change was needed for double than for half-loudness. Experiments on bisection of loudness intervals were also carried out, the results showing discrepancies from predicted values.'

(*Author's precis*)

Masking

DEATHERAGE, B. H., DAVIS, H. and ELDREDGE, D. Physiological evidence for the masking of low frequencies by high. *J. acoust. Soc. Amer.*, 29, 1957, 132-137.

Action potentials and cochlear microphonics were recorded from electrodes in the first and third turns of the guinea-pig cochlea. The masking effects of the following four sounds on the perception of 500-cps tone pips were studied: (1) a narrow band of noise centering on 500 cps; (2) a narrow band of noise centering on 6950 cps; (3) a 6950-cps pure tone; and (4) a tone of 6950 cps, which was amplitude modulated by a 500-cps pure tone. Three different kinds of masking were observed: (1) the usual masking phenomenon, in which there is an actual pre-empting of the perception of the tone pips; (2) an 'interference effect' in which there is no pre-empting, but a reduction in amplitude in response to the tone pip; and (3) 'remote masking,' characterized by an elevation in threshold for the low-frequency tone pips in the presence of high-frequency masking at high amplitudes. The authors explain this latter phenomenon as being due to 'an unsymmetrical mechanical action of the inner ear.'

(*P. A. Yantis*)

MILLER, M. H. and FORMAN, F. S. The use of tympanic injections as an experimental control in masking research. *Arch. Otolaryng., Chicago*, 64, 1956, 526-536.

Mental Retardation

LEBERFELD, D. T. Speech therapy and the mentally retarded child. *Train. Sch. Bull.*, 53, 1957, 273-274.

The author stresses the importance of early speech therapy with retarded children. Research areas are suggested which might clarify the relationship of language and speech development to mental ability.

(*B. B. Schlanger*)

Middle Ear Muscles

GISSELSSON, L., LOFSTROM, B. and METZ, O. The effect of succinylcholine on the middle ear muscles and on the transmission of sound through the middle ear. *Acta Otolaryng.*, 47, 1957, 233-244.

The investigators subjected cats, guinea pigs and humans to vascular injections of succinylcholine. Electromyographs of middle ear muscles, measurements of amplitude changes in cochlear potentials, and records of the modifications in the acoustic impedance of the tympanic membranes were gathered on each of the subjects. Among other things, the results showed that, unlike the cats, the middle ear muscles of men and guinea pigs did not contract in response to the drug injection.

(*D. A. LaRusso*)

Motor Response to Music

OLERON, G. Études expérimentales des reactions motrices a la musique. (Experimental studies of motor reactions to music.) *Rev. Laryng., Bord.*, 77, 1956, 800-815.

Electromyograms from the hands and feet of subjects who were listening to music showed both a general increase in muscle tone and clonic reactions related to the rhythm of the music. The activity usually appeared first in the right hand (of right-handed persons) and then spread to the other limbs. The muscular patterns of listeners who are essentially 'sensory' is said to differ from that of listeners who are 'perceptive' and 'imaginative.'

(*R. Goldstein*)

Musical Tonality Judgments

CORSO, J. F. Absolute judgments of musical tonality. *J. acoust. Soc. Amer.*, 29, 1957, 138-144.

Noise

COLE, J. N., KYRAZIS, D. T. and OESTREICHER, H. L. A method for calculating the acoustical characteristics of aircraft in flight. WADC TN 56-488, Dec. 1956.

ELDRED, K. M. and KYRAZIS, D. T. Noise characteristics of Air Force turbojet aircraft. WADC TN 56-280.

The results of noise measurements on all current Air Force operational turbojet aircraft are reported.

(*J. C. Webster*)

JERISON, H. J. Effect of a combination of noise and fatigue in a complex counting task. Wright Air Dev. Cntr. TR 55-360, December 1955.

WILBANKS, W. A., WEBB, W. B. and TOLHURST, G. C. A study of intellectual activity in a noisy environment. USN Schl. Aviat. Med., Proj. NM 001 104 100, Rep. 1, Oct. 1956.

Tests of mechanical reasoning, abstract reasoning, clerical speed and accuracy, and numerical ability were given to subjects in 110-114 db of propeller noise. Only clerical speed and accuracy suffered significantly. The authors conclude that, for tasks in noise, job proficiency is a more important factor than a high tolerance level.

(*J. C. Webster*)

Palate Growth

SUBTELNY, J. D. The growth of the soft palate. *Cleft Palate Bull.*, 7 (1), 1957, 4-5.

Soft tissue changes in the velopharyngeal environment were studied with serial roentgenograms on 30 subjects from infancy to early adulthood. The increase of soft palate length was most rapid until approximately two years of age. After a plateau until about age five, growth resumed at a slow, steady rate until early adulthood. The angular relationship between the soft and hard palates also changed as the soft palate approached a parallel relationship with the

posterior pharyngeal wall. The average vertical height of the nasopharynx doubled from infancy to adulthood. There was also a general increase in the depth of the nasopharynx, but with periods of fluctuation which were probably the result of adenoid growth and growth of the upper face. Because of these changes the author believes diagnosis must include considerations of future as well as present palatal adequacy.

(*A. J. Berlin*)

Phoneme Transitions

Moser, H. M., Dreher, J. J. and Harbold, G. J. Recognition of three magnitudes of interphonemic transitional influence. Ohio State Res. Found., Tech. Note 33, December, 1955.

The question of whether the magnitude of the interphonemic transition between consonants and vowels aids in correctly identifying CV, VC and CVC nonsense syllables was investigated. Six male talkers recorded 48 syllables which were equally divided among maximum, medium, and minimum transitions. The results of 24 trained listeners in S/N of 3 db showed minimum transitions to be most intelligible, maximum transitions next. Initial transitions were more intelligible than final ones. Medium transitions were least intelligible and no differences were found between initial and final positions.

(*J. C. Webster*)

Phonics

Rudisill, M. Interrelations of functional phonic knowledge, reading, spelling, and mental age. *Elem. Sch. J.*, 57, 1957, 264-267.

This study investigated the interrelations between functional phonic knowledge, reading achievement, spelling achievement, and mental age among 315 children in the third grade. The findings suggest that there are common factors among reading, spelling, and phonic knowledge which are independent of intelligence. These results are said to add to the evidence that functional phonic knowledge makes a substantial contribution to achievement in reading and spelling.

(*B. B. Schlanger*)

Pneumoencephalography

Charash, L. I. and Dunning, H. S. An appraisal of pneumoencephalography in mental retardation and epilepsy. *Pediatrics*, 18, 1956, 716-720.

On the basis of results derived from pneumoencephalography of 151 mentally retarded or epileptic children, the authors conclude that pneumoencephalography should be abandoned as a diagnostic tool in such cases.

(*B. B. Schlanger*)

Psychotherapy and Psychiatry

Dixon, N. F. Symbolic associations following subliminal stimulation. *Int. J. Psychoanal.*, 37, 1956, 159-170.

The author reports on research into the effect of subliminal stimulation on verbal and autonomic behavior. Evidence suggests that verbal responses made during such stimulation tend to be associations with the material presented, and that the content of these associations points to their being symbolic versions, in the Freudian sense, of the act or object connoted by the stimulus material.

(*J. G. Sheehan*)

Leary, T. A theory and methodology for measuring fantasy and imaginative expression. *J. Pers.*, 25, 1956, 159-175.

The author presents a theory of and measurement method for dealing with imaginative, preconscious behavior. He discusses functions of imaginative expressions, and maintenance of the feeling of self-esteem and uniqueness through the time-binding postponement of impulse. He notes that the theory implies that imaginative productions can be used by psychologists to determine the amount of and interpersonal sources of anxiety and to predict future behavior.

(*J. G. Sheehan*)

Mazzanti, V. E. and Bessell, H. Communication through the latent language. *Amer. J. Psychother.*, 10, 1956, 250-262.

The authors define 'latent language' as a disguised form of communication, usually unconscious, wherein a person tells about himself by attributing his feelings or behavior to a third person, object, or situa-

tion in order to find out how someone else (*i.e.*, the therapist) will react to him and thus to safeguard against potential rejection. They indicate that latency is a matter of degree and that references may be thinly veiled. The more fearful of rejection a person is, the more likely he may need to resort to latent references. Schizophrenics use this means of communication frequently. The authors note that if one 'tunes in' on possible latent meanings, one has an increased chance of making sense out of what may first appear to be meaningless.

(*J. G. Sheehan*)

MEISTER, A. Perception and acceptance of power relations in children. *Group Psychother.*, 9, 1956, 153-163.

This report is based on the works of Jean Piaget and on his distinction between the two types of social relations, 'constraint' and 'cooperation.' Information is given concerning relationships between stage of development in children and type of prevalent social relations.

(*J. G. Sheehan*)

ROSENBAUM, G. Stimulus generalization as function of clinical anxiety. *J. abnorm. (soc.) Psychol.*, 53, 1956, 281-285.

Using 72 male psychiatric patients and 72 male college students as subjects, the author investigated the effects of anxiety upon stimulus generalization. Under a strong-shock condition, the groups designated as high in clinical anxiety showed significantly more generalization than the low clinical anxiety groups. No difference was found between the two levels of clinical anxiety for either a weak-shock or buzzer condition. The author concludes that the heightened responsiveness of anxious individuals to a wide range of stimuli may be subsumed under the more general effects of increased drive upon stimulus generalization, but that clinically defined anxiety is activated as a drive variable only when certain noxious cues are present.

(*J. G. Sheehan*)

WEINSTEIN, E. A., KAHN, R. L. and MALITZ, S. Confabulation as a social process. *Psychiatry*, 19, 1956, 383-396.

The confabulations of brain-injured patients were studied. The confabulations were said to be the means for expressing views about contemporary problems, for establishing relatedness in the patient's environment, and for allaying anxiety.

(*J. J. O'Neill*)

Recruitment Tests

SPUEHLER, H. A. and HANLEY, T. D. An auditory loudness recruitment test battery. *Arch. Otolaryng., Chicago*, 65, 1957, 183-190.

The authors report a study 'to establish the capability of a series of tests to distinguish between normal hearing persons and those whose auditory perception is characterized by recruitment in the loudness function. The following tests are used: (1) range of comfortable loudness, (2) difference limen test, and (3) speech sound discrimination test. Results are said to indicate the usefulness of all three tests. The comfortable loudness range was found to be more restricted in recruiting ears. A smaller difference limen was found as well as 'a higher number of correct responses in a restricted range immediately above the threshold of detectability.'

(*J. M. Palmer*)

Rehabilitation Centers

DOWNS, M. and CARSON, E. Hearing rehabilitation centers in the United States. *Arch. Otolaryng., Chicago*, 65, 1957, 356-371.

A tabulation of 145 hearing rehabilitation centers in the United States is presented. Included are types of medical supervision, referral sources, clientele accepted, equipment, the services presented by each center, and ASHA certification levels held by the staff.

(*J. M. Palmer*)

Research Support

YOUNG, M. L. and WILSON, J. T. Government support of extramural psychological research: fiscal year 1956. *Amer. Psychologist*, 11, 1956, 630-633.

This report provides information concerning the amount and sources of funds which are available from the Federal Government for the support of psychological research. It reflects the relative emphasis being placed on specific areas within the general field by such support programs, and shows the distribution of funds geographically.

(*J. G. Sheehan*)

Sound Localization

KIKUCHI, Y. Objective allocation of sound-image from binaural stimulation. *J. acoust. Soc. Amer.*, 29, 1957, 124-128.

This paper describes two methods for making an objective quantification of the location of the sound image that results from binaural acoustic stimulation. Data are presented in favor of the 'nullity method,' a technique which involves the making of adjustments in one of two channels until a reversal of signals between the two ears does not appear to change the location of the sound image.

(*W. R. Tiffany*)

Speech Communications Jamming

CHRISTMAN, R. J. and DOHERTY, W. J. Human factors annotated bibliography on speech communications jamming. Rome Air Dev. Cntr. TR 57-25, Feb. 1957.

This non-critical, annotated bibliography contains summaries of 32 recent publications relating to speech jamming from a 'human factors' viewpoint. Two smaller sections contain seven items on intelligibility testing and seven on general intelligibility and jamming.

(*J. C. Webster*)

Speech Development

SAMPSON, O. C. A study of speech development in children of 18-30 months. *Brit. J. educ. Psychol.*, 26, 1956, 194-201.

In a longitudinal study of 25 boys and 25 girls, speech samples were analyzed for each of three periods. At 18 months, incomprehensible vocalizations, autistic in character, were typical. At 24 months, single words supplanted jargon and conversational exchange was beginning. At 30 months, word-combinations and sentences were typical. The quantity of comprehensible production at 18 months was predictive of quality at 30 months. No significant differences between the sexes were found.

(*F. Robinson*)

Speech Measures of Catharsis

GOLDMAN-EISLER, F. A contribution to the objective measurement of the cathartic process. I. *J. ment. Sci.*, 102, 1956, 78-95.

Seven subjects were interviewed while timed simultaneous recordings of muscle potentials and of speech were made. The speech records were analyzed for number of syllables per utterance, the total duration of each utterance, and the inspiration in each utterance. From these were computed a speech rate, ventilation percentage and respiration rate. In the different interviews these variables were differently related. There was found to be a link between the stages of the cathartic process and the levels of respiratory activity. Abreaction through the verbalization of emotional scenes was shown to be a measurable process.

(*A. J. Berlin*)

Speech Perception

LIBERMAN, A. M. Some results of research on speech perception. *J. acoust. Soc. Amer.*, 29, 1957, 117-123.

A general review and discussion relating to the results of recent experiments with synthetic speech is presented. The author lists three classes of consonant cues, divided according to where and how the sounds are produced: (1) the frictions of the fricatives and affricates, and the bursts of the stops; (2) the direction and extent of acoustic transitions to the next phone—especially the characteristics of the second-formant transition; and (3) cues provided by the absence or presence of nasal resonance. The effects of learning on the discrimination of differences in phonemic structure are discussed and some of the research relating to this phenomenon is reviewed.

(*P. A. Yantis*)

Speech Synthesizer

FLANAGAN, J. L. Note on the design of 'terminal-analog' speech synthesizers. *J. acoust. Soc. Amer.*, 29, 1957, 306-310.

'The synthesis of vowel sounds by lumped-constant electrical networks having transfer functions similar to the transmission properties of the vocal tract is considered. A comparison is made between cascade and parallel connections of simple electrical resonators for producing vowel sounds. The cascade arrangement of resonators is shown to yield vowel sounds having formants of proper amplitude when information specifying the formant frequencies only is known.'

(*Author's precis*)

FRY, D. B. and DENES, P. On presenting the output of a mechanical speech recognizer. *J. acoust. Soc. Amer.*, 29, 1957, 364-367.

Stop Consonants

HALLE, M., HUGHES, G. W. and RADLEY, J. -P.A. Acoustic properties of stop consonants. *J. acoust. Soc. Amer.* 29, 1957, 107-116.

'The two major cues for stop consonants, the burst of the stop release and the formant transitions in the adjacent vowel, were investigated. Detailed energy density spectra of the bursts were prepared. The transitions were studied by means of sonagrams. Possible criteria for identification were developed and tested. In order to assess the efficacy of the two types of cue, perceptual tests were conducted with isolated segments that contained either stop bursts or vowel transitions alone. Common acoustical properties of bursts and formant transitions are noted. Differences as well as similarities are discussed in the light of different varieties of pitch judgments.'

(*Authors' precis*)

Stuttering

BERNALDO DE QUIR'OS, J. Sur la pathogénie et la thérapeutique des altérations du rythme de la parole. (Concerning the pathogenesis of and therapy for alterations in the rhythm of speech.) *Rev. Laryng., Bord.*, 77, 1956, 740-751.

Dysrhythmias in speech are said to be usually symptomatic of disruption of the normal control of the cortex over the diencephalon. Pharmacologic treatment for dysrhythmia should be aimed at reinforcing the activity of the cortex or at subduing the unmoderated activity of the diencephalon. The speech therapist is advised to help the patient find his own natural rhythm instead of imposing any artificial, regular rhythm.

(*R. Goldstein*)

GOODSTEIN, L. D. and DAHLSTROM, W. G. MMPI differences between parents of stuttering and non-stuttering children. *J. consult. Psychol.*, 20, 1956, 365-370.

The Minnesota Multiphasic Personality Inventory was administered to 447 parents of stuttering and non-stuttering children for the purpose of comparing general adjustment ability and various personality characteristics. The results, showing no significant difference between parents of stutterers and parents of non-stutterers, lead the authors to theorize that parental attitudes which influence stuttering are limited and specific to the speech situation.

(*B. S. Street*)

Therapy Programs

SCHLANGER, B. B. The speech and hearing program of The Training School. *Train. Sch. Bull.*, 53, 1957, 267-272.

The speech and hearing diagnostic and therapy program for mentally retarded children at The Training School at Vineland is discussed. Therapy philosophy and goals are illustrated.

(*Author's precis*)

TISZA, V. B. and ANGOFF, K. A play program and its function in a pediatric hospital. *Pediatrics*, 19, 1957, 293-302.

Traumatic Hearing Loss

EWENS, R. A. Problems of industry in a state with hearing loss compensation laws. *Noise Control*, 3 (2), 57-58, 86.

FLETCHER, J. L. and SOLOMON, L. N. A survey of hearing losses among armor personnel. Army Medical Research Lab. Rpt. No. 282, 29 Aug. 1956.

'The hearing of 3827 armor personnel was tested and related to their age, noise exposure, use of ear protection, previous aural medical history, type of ear protection used, branch of service, and type of hearing loss as a function of noise exposure. Hearing losses (particularly high frequency losses) were found to increase with age and noise exposure. 'Positive' aural medical history personnel had greater losses than those with a 'negative' history. Pre-exposure tinnitus and tinnitus persisting after exposure were found to be characteristic of personnel with relatively larger hearing losses. Hearing losses among tankers, armor infantrymen, and armor artillerymen did not differ significantly. Results obtained from group audiometry closely approximated results from individual audiometry.'

(*Authors' precis*)

SYMONS, N. S. Legal aspects of the hearing loss problems. *Noise Control*, 3 (2), 1957, 49-56.

Verbal Response Learning

PETERSON, M. J. Verbal response strength as a function of cultural frequency, schedule of reinforcement, and number of trials. *J. exp. Psychol.*, 52, 1956, 371-376.

The author studied effects of cultural frequency, schedule of reinforcement, and number of trials upon learning and extinction of verbal responses. Findings indicate that high cultural frequency responses were learned with fewer preceding responses than low frequency responses but no differential effect was apparent during extinction. Responses learned under a schedule of continuous reinforcement showed fewer incorrect responses and required fewer trials to reach the extinction criterion than those under partial reinforcement. The number of trials was inversely related to the incorrect responses and directly related to the trials to extinction.

(*J. G. Sheehan*)

Visual Aid to Intelligibility

DECKER, L. R. and PICKETT, J. M. Visual indication of speech as an aid to hearing it in noise and babble. *J. acoust. Soc. Amer.*, 29, 1957, 150-151.

'Intelligibility tests were conducted to determine whether watching a visual indication of a speech signal would improve its intelligibility under conditions of low signal-to-noise ratio. Noises were tested which had different amounts of similarity to speech. The visual indication was presented on a VU meter. It was found that there is no improvement in intelligibility associated with this type of supplementary visual information.'

(*Authors' precis*)

Vocal Palsies

CAVANAGH, F. Vocal palsies in children. *Speech*, 20, 1956, 45-57.

After a review of historical reports of vocal cord palsies in children, the author reports on a series of cases. The first six months is the period of greatest hazard for these children, and tracheotomies were necessary in 11 of 37 children. The majority had symptoms of stridor, while others had hoarseness, dyspnea or cyanosis. In 10 children both cords were paralysed, in four only the left cord, and in 23 only the right cord was involved. Some cases had partial recovery in a few months, but one or two children showed no recovery in more than four years. Etiology could be established in only eight cases.

(*A. J. Berlin*)

Vowel Information

LADEFOGED, P. and BROADBENT, D. E. Information conveyed by vowels. *J. acoust. Soc. Amer.*, 29, 1957, 98-104.

'An experiment has been carried out which shows that the linguistic information conveyed by a vowel sound does not depend on the absolute values of its formant frequencies, but on the relationship between the formant frequencies for that vowel and the formant frequencies of other vowels pronounced by that speaker. Six versions of the sentence *Please say what this word is* were synthesized on a parametric artificial talking device. Four test words of the form *b-* (*vowel*) *-t* were also synthesized. It is shown that the identification of the test word depends on the formant structure of the introductory sentence. Some psychological implications of this experiment are discussed, and hypotheses are put forward concerning the ways in which all three kinds of information are conveyed by vowels.'

(*P. A. Yantis*)

Whispered Speech

MEYER-EPPLER, W. Realization of prosodic features in whispered speech. *J. acoust. Soc. Amer.*, 29, 1957, 104-106.

'Experiments utilizing a visible-speech analyzer showed that changes of pitch in normal (voiced) speech are replaced in whispered speech by shifts of some formant regions accompanied by added noise between the higher formants.'

(*Author's precis*)

News And Announcements

Significant Trends in the Profession

Professor I. Kirikae, of the Department of Oto-Rhino-Laryngology of the University of Tokyo, reports the inauguration of The Stuttering Study Group. This group was formed through the efforts of a group of students of the Faculty of Medicine. It is the aim of this organization to encourage close cooperation and systematic teamwork among scholars and research workers in various fields towards the solution of the problem of stuttering. Four issues of a nonperiodical journal, 'Stuttering,' have been published in Japanese. The members of the organization have expressed a desire to receive any available literature on this subject from members of the ASHA. Suggested data include information about stuttering studies in the United States, addresses of individual speech scholars, groups, and institutions, bibliographies on stuttering and related areas, information concerning the availability of training and of scholarships in American speech clinics and institutions, *etc*. The organization will welcome correspondence between its members and those of ASHA.

The Easter Seal Research Foundation of the National Society for Crippled Children and Adults provides grants-in-aid for investigations concerned with the prevention and treatment of physical and associated disabilities, and the rehabilitation of the physically handicapped. Disabilities may be congenital or may result from accident or illness. Accident prevention, *per se*, is outside the scope of the Foundation's research interest.

News and Announcements

Funds for research grants are derived from a fixed percentage of the gross returns of the annual Easter Seal campaign conducted by the National Society and its state and local affiliates. The Foundation is concerned with investigations of (1) the causes of crippling, (2) the prevention of physical disabilities, (3) methods for improving impaired functions or for mitigating the results of dysfunction, and (4) measures of enhancing the effectiveness of the rehabilitation process. Research projects may involve basic or clinical research or both. The Foundation invites applications for grants-in-aid. Applications filed between September 1 and March 31 are reviewed in June. Applications filed between April 1 and August 31 are reviewed in November. Awards are announced during the months of June and November.

A research grant for the study of 'Hearing Aid Performance *vs* Physical Characteristics' has been awarded the Cleveland Hearing and Speech Center by the National Institutes of Public Health, Institute on Neurological Diseases and Blindness. Dr. Earl D. Schubert, Coordinator of Research at the Cleveland Hearing and Speech Center received notification of the grant which has been approved for continuation for the two subsequent years.

The Department of Public Instruction of the State of Pennsylvania reports that measures are under way to improve the qualifications and standards of speech and hearing services for Pennsylvania's handicapped children. Invitations were extended to all colleges and universities through the Commonwealth which offer speech and hearing

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News and Announcements is edited by Mary W. Huber, Los Angeles State College, assisted by the following committee: Sue Earnest, San Diego State College; Lester L. Hale, University of Florida; Henry Moser, Ohio State University; Severina Nelson, University of Illinois; Max Nelson, Michigan State College; and Bernard Stoll, University of Kansas.

educational programs to send their respective representatives to a conference held on February 13, 1957. The group made preliminary recommendations for future discussions and action in the following areas: improvement of professional qualifications and standards of teacher personnel in the field of speech and hearing education, and recruiting and training additional qualified personnel to meet immediate and future needs and to rectify the shortcomings in the existing programs for aiding handicapped children.

Columbia University announces postgraduate cerebral palsy courses for 1957-1958. An interdisciplinary approach to cerebral palsy is presented through lecture, clinical affiliation and discussion seminar. Representatives of differing clinical methods are invited to demonstrate the practical application of their theories. Students are encouraged to acquaint themselves with all technics, weighing the contribution of each to the needs of specific patients. There is ample opportunity to question authorities in the field, to exchange experience, and to apply critical thinking toward the development of a dynamic approach to the problems involved in therapy. Physicians' course: 3 weeks full time, fee $100, October 14 to November 1, 1957, and March 3 to March 21, 1958. Therapists and Nurses' course, 9 weeks full time, 8 points credit, fee $210, October 14 to December 13, 1957, and March 3 to May 2, 1958. For further information, write Post-Graduate Course in Cerebral Palsy, Office of the Dean of Physicians and Surgeons, 630 West 168 Street, New York 32, N. Y.

The California School for Cerebral Palsied Children, San Francisco, has announced a pilot program for language retarded children. The program is multiple in scope, dealing with the diagnosis and therapy of those children suspected of being either deaf, aphasic, or both. The children for whom the program is intended are those whose primary problem is not a hearing loss (when this is known), a deep-rooted psychological disorder, mental retardation, or primarily a neuro-muscular disorder, but rather those who are language retarded and whose disorder springs from *cerebral dysfunction*. The program is designed to prepare the child to return to his local community in the shortest possible time for long-term training in local facilities.

The Columbus Hearing Society, Columbus, Ohio, announces the inauguration of a new speech program to provide diagnosis and therapy for preschool children. Previously these services were offered only to those persons whose speech difficulty was associated with a loss of hearing. The Society's new speech program will be well-coordinated with other community facilities serving the speech handicapped. It will make full use of hospital and university services in a cooperative effort to aid the preschool children it serves.

The Speech and Dramatic Art Department and the Speech and Hearing Center of Adelphi College, Garden City, New York, announce the inception of a Master of Science degree program in speech and hearing rehabilitation. This program will be an integral part of the Institute of Health, Education, and Welfare at Adelphi College. The Institute is designed to utilize a threefold approach which combines academic preparation, clinical practice, and related research. The distinctive feature of the Institute is its emphasis upon the coordination of many related professions to fulfill its primary purpose of preparing competent team members to serve the health, education, and welfare needs of individuals and the community.

Speech therapists for smaller Colorado communities will be trained through a scholarship program launched by the Colorado Society for Crippled Children and Adults. Sponsored in cooperation with local society affiliates and the University of Denver, the program supports study at the University, beginning with the 1957 summer quarter. Eligible are senior-year students in speech pathology or graduate students in education who wish to specialize or continue in speech areas. Candidates must live in rural areas of Colorado and agree to practice speech therapy in their home areas for at least a year after completion of training.

Elizabeth Nemoy, a Fellow in the American Speech and Hearing Association, retired November 1956, from her work in speech correction in the Philadelphia Public Schools to New Haven, Connecticut. Mrs. Nemoy is the author of *Speech Correction Through Story-Telling Units* and co-author

of *The Correction of Defective Consonant Sounds.*

The Clara B. Stoddard Award for the academic year of 1956-57 was awarded to Mr. Robert E. Sandlin, instructor and graduate student of the Wayne State University Speech and Hearing Clinic.

Meetings Announced

American Speech and Hearing Association, Netherlands Plaza Hotel, Cincinnati, Ohio, November 20-22, 1957.

National Society for Crippled Children and Adults, Inc., The Palmer House, Chicago, Illinois, October 31 to November 2, 1957.

American Academy for Cerebral Palsy, New Orleans, Louisiana, November 25-27, 1957.

Clinical session, American Medical Association, Philadelphia, Pennsylvania, December 3-6, 1957.

California Speech and Hearing Association, The California Hotel, Fresno, California, October 25-26, 1957.

International Convention on Speech Therapy, London, England, August 17-22, 1959.

New Materials

A set of three filmstrips entitled 'These Untrained Tongues,' prepared by Ruth M. Clark and Libby Radus of the University of Denver, includes (1) The Nature of Speech Defects, (2) How Speech Defects Develop, and (3) What Speech Clinics are Doing. The set, in color and with manual (no. CA157S), costs $19.50. Available through Davis Audio-Visual Company, 2023 East Colfax Ave., Denver 6, Colorado.

'Out from Silence,' another filmstrip from the University of Denver, by Mrs. Marion Downs, also comes in three units: (1) Nature of Hearing and Hearing Loss, (2) Safeguarding Your Hearing, and (3) Rehabilitation of the Hard of Hearing. Cost: $19.50. Write to The Society for Visual Education, Inc., 1345 W. Diversey Parkway, Chicago 14, Illinois.

'The Cerebral Palsy Speech Evaluation and Progress Chart,' prepared by Mary W. Huber and Dorothy Unger, is still available through the New York State Association for Crippled Children, Inc., 257 Fourth Avenue, New York 10, N. Y. One hundred copies, $4.87.

The Beltone Institute for Hearing Research has published 'Variations in Bone Conduction as Related to the Force of Pressure Exerted on the Vibrator,' by E. Konig (Translation No. 6, May, 1957). Upon request, this translation or any other in the series will be sent without charge to any library or interested individual. Address Circulation Manager, Translations of the Beltone Institute for Hearing Research, 2900 West 36th Street, Chicago 32, Illinois.

The Board of Education of the City of New York, Board of Examiners, has published a summary of a 'Study of the Practicability of Certifying, During the Junior Year in College, Satisfactoriness of Speech for License to Teach in the Elementary Schools of the City of New York. The report includes a brief description of the study, a discussion of limitations of data upon which the study was based, and the conclusions drawn, with their implications.

'The Lost Art of Studying,' an address delivered at the 1956 University of Michigan Summer Speech Conference by Loren Reid, Department of Speech, University of Missouri, has been published and is available through the Department of Speech, University of Michigan, Ann Arbor, Michigan.

Graduate Assistantships, Fellowships and Scholarships

Clinical Assistantships. Speech and Hearing Clinic, Pennsylvania State University. Twenty hours per week: stipends of $1206, $1305, and $1404 for regular school year, waiver of tuition fees, may enroll for 10 credits per semester. Ten hours per week: stipends of $603, $652, and $702 for regular school year, waiver of tuition fees, may enroll for 13 credits per semester. Address:

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E. T. McDonald, Director, Speech and Hearing Clinic, Pennsylvania State University, University Park, Pennsylvania.

Clinical Assistantships. University of Southern California. Las Floristas Preschool Speech Disorder Prevention Clinic. Eighteen hours per week therapy with preschool children and parent counseling: $1500 for nine months. USC Speech-Hearing Clinic: half-time and quarter-time speech pathology and audiology assistantships. Half-time: 18 hours per week, $1140 - $1500 for nine months. Quarter-time: nine hours per week, $570 - $750 for nine months.

Research Assistantships. University of Southern California. Las Floristas Preschool Speech Disorder Prevention Clinic. Eighteen hours per week, $1500 for nine months. USC Speech-Hearing Clinic: quarter-time, nine hours per week, $570 - $750 for nine months.

Teaching Assistantships. University of Southern California. Instruct and supervise students in voice improvement and in speech improvement for foreign-born. Half-time: instruct six units of course work, $1140. Quarter-time: instruct three units of course work, $570. Clinical, research, and teaching assistants are expected to be enrolled in the graduate school for a minimum of 8 units per semester. Address: William H. Perkins, Ph.D., Speech-Hearing Clinic, University of Southern California, Los Angeles 7, California.

THIRTY-THIRD ANNUAL CONVENTION

November 20-22, Netherland Hilton Hotel, Cincinnati

AMERICAN SPEECH AND HEARING ASSOCIATION

PROGRAM ANNOUNCEMENT

(Some further sections and additional details may be announced later.)

Monday, November 18

(Pre-Convention)

9:00 a.m., 2:00 p.m. and 7:30 p.m.

Meeting of the Executive Council

Tuesday, November 19

(Pre-Convention)

9:00 a.m., 2:00 p.m. and 7:30 p.m.

Meeting of the Executive Council

10:00 a.m.

Meetings of Association Committees

7:30 p.m.

1956-57 National Executive Council, Sigma Alpha Eta

Wednesday, November 20

THE PUBLIC SCHOOL SPEECH THERAPIST—
SUCCESS OR FAILURE

9:00-10:25 a.m.

Chairman: John Palmer, University of Washington

Personality traits which can be identified in the student which seem to be associated with successful speech therapists. John Wiley, University of Nebraska

Personality traits which can be identified that seem to be associated with the experienced and successful speech therapist. Conrad Wedberg, California State Department of Public Instruction

Aspects of training which contribute to becoming a successful practicing speech therapist. Dorathy Eckelmann, Illinois State Normal University

Supervisor counseling techniques which seem to develop successful speech therapists. Adah Miner, Shoreline Public Schools, Seattle

Coordinating the training and supervisory services. John Palmer, University of Washington

CURRENT RESEARCH IN STUTTERING

9:00-10:25 a.m.

Chairman: Dorothy Sherman, State University of Iowa

Adjustment patterns of stutterers and non-stutterers as revealed by the Rorschach. Jack Matthews and George Shames, University of Pittsburgh

Guilt as a source of conflict in stuttering. Joseph Sheehan, University of California, Los Angeles

An evaluation of Miltown as an adjunct to stuttering therapy. Louise R. Kent and Dean Williams, Indiana University

A clinical study of the consistency effect in the repetitions and prolongations of young stutterers. Oliver Bloodstein, Brooklyn College

A comparison of the number, different types, and severity of stuttering behaviors judged in visual and acoustical samples of the same spoken phrases. Harold L. Luper, University of Georgia

Aggression as a factor in stuttering behavior. George J. Wischner, University of Pittsburgh

CONDITIONS RELATED TO THE ONSET OF DEFECTIVE ARTICULATION

9:00-10:25 a.m.

Chairman: McKenzie Buck, University of Florida

An investigation of auditory memory span among children using memory span tests of digits and speech sounds. Charles L. Johnson, Veterans Administration Center, Dayton, Ohio

The relevance of visual impairment to the development of articulation and sound discrimination. H. Gene England, Vanderbilt University

A summary of results obtained with a picture test of sound discrimination. R. L. Schiefelbusch, University of Kansas

A comparison of the speech problems of orthodontically treated and untreated groups of individuals with class II, Division I malocclusion. Stanley R. Horsch, St. Louis University and William D. Trotter, Marquette University

Discussion

SPEECH THERAPY AND DIAGNOSIS FOR MENTALLY RETARDED CHILDREN

9:00-10:25 a.m.

Chairman: Albert T. Murphy, Boston University

The speech and oral language behavior of educable, mentally retarded children. Eugene M Batza, Bowling Green State University

Factors affecting language development in mentally retarded children. Herold Lillywhite, University of Oregon Medical School

An experimental comparison of individual and group speech therapy with mentally retarded children. Rosemary C. Pfeifer, University of Arkansas

Current problems and future needs in speech therapy with the mentally retarded. Benard Schlanger, The Training School, Vineland, New Jersey

CONTRIBUTED PAPERS IN AUDIOLOGY

9:00-to 10:25 a.m.

Chairman: Frank M. Lassman, University of Minnesota

An evaluation of the auditory skills of blinded individuals training with pilot dogs. Donald J. Baker, John J. O'Neill, and Herbert J. Oyer, Ohio State University

Speech audiometry via magnetic recording cards. Maurice H. Miller, Columbia Presbyterian Medical Center

Audiometric contraindication for stapes mobilization surgery. Philip E. Rosenberg, Temple University

Electrophysiologic techniques for objective determination of thresholds in young children. Frank B. Withrow, Jr. and Robert Goldstein, Central Institute for the Deaf

Discussion

DIAGNOSTIC TESTING FOR APHASIA

10:30-11:55 a.m.

Chairman: Lyle V. Jones, University of North Carolina

Participants: Joseph M. Wepman, University of Chicago
Hildred Schuell, University of Minnesota Medical School and Va Hospital, Minneapolis
Jon Eisenson, Queens Speech and Hearing Center

Discussion

'QUIZ THE EXPERTS' SESSION

10:30-11:55 a.m.

Articulation Problems. Charles Van Riper, Western Michigan College
Public School Therapy Programs. Ruth Beckey Irwin, Ohio State University
Cerebral Palsy. Harold Westlake, Northwestern University
Voice Problems. Paul Moore, Northwestern University

DEMONSTRATION AND DISCUSSION BY THE STAFF OF THE CLEFT PALATE CLINIC OF CHILDREN'S HOSPITAL, CINCINNATI, OHIO

10:30-11:55 a.m.

Chairman: Eugene T. McDonald, The Pennsylvania State University

Presentation: Jacob James Longacre and Staff

EXPERIMENTAL PHONETICS: SPEECH ANALYSIS AND SYNTHESIS

10:30-11:55 a.m.

Chairman: Arthur S. House, Massachusetts Institute of Technology

Spectral properties of the glottal sound source. J. L. Flanagan, Bell Telephone Laboratories
Measurements of the transient response of the vocal tract. K. N. Stevens and A. S. House, Massachusetts Institute of Technology
An electrostatic delay system for speech research. G. E. Peterson, University of Michigan
The role of phoneme labeling in the discrimination of speech sounds. Katherine S. Harris, Haskins Laboratories, New York

PROBLEMS OF GERIATRIC AUDIOLOGY

10:30-11:55 a.m.

Chairman: William G. Hardy, Johns Hopkins Hospital

Auditory function and dysfunction in the aged. John H. Gaeth, Wayne State University
Differential diagnostic considerations. Harriet L. Haskins, Johns Hopkins Hospital
Problems of rehabilitation. Ira Belmont, New York Medical College
Discussion

A SYMPOSIUM OF RECOVERED STUTTERERS

2:00-4:55 p.m.

Chairman: Joseph Sheehan, University of California, Los Angeles

(A number of recovered stutterers will attempt to explain through what processes they were able to gain control over their problem.)

Participants: Charles Bluemel, Denver, Colorado
John Clancy, University of Michigan
Waldo Coleman, San Francisco, California
James Frick, Pennsylvania State University
Wendell Johnson, State University of Iowa
C. Van Riper, Western Michigan College
Dean Williams, University of Indiana

Discussion and questions

DIAGNOSIS AND THERAPY IN BRAIN-INJURED CHILDREN

2:00-3:25 p.m.

Chairman: George W. Gens, State Teachers College, Newark, New Jersey

The differential diagnosis of language disorders in young children. Helmer R. Myklebust, Northwestern University

Deafness in childhood: retrospect and prospect. William G. Hardy, The Johns Hopkins Hospital

Speech problems of the mentally retarded aphasoid. Bernard B. Schlanger, The Training School, Vineland, New Jersey

The brain-injured: testing and instruction. Louis M. DiCarlo, Syracuse University

Teaching speech and language to aphasic children. Frank R. Kleffner, Central Institute for the Deaf

Discussion

PRACTICAL INTERPRETATION OF RESEARCH IN PUBLIC SCHOOL SPEECH THERAPY

2:00-3:25 p.m.

Chairman: Rolland J. Van Hattum, Rochester Public Schools, New York

A comparison of parents' and a speech pathologist's evaluation concerning speech of preschool children. Donald E. Mowrer, Moultrie Speech and Hearing Center, Georgia

Some factors which influence the frequency and duration of treatment sessions. James V. Frick and Eugene T. McDonald, Pennsylvania State University

A study of parent attitudes. John Wiley, University of Nebraska

An analysis of the acceptance and rejection of speech handicapped children by classroom teachers. Albert T. Murphy, Boston University

Comments and summary: Margaret Hall Powers, Chicago Public Schools (practical interpretation of this research for the public school therapist following each paper).

ESSENTIAL ELEMENTS OF SPEECH AND HEARING CENTER OPERATION

2:00-3:25 p.m.

Chairman: Warren E. Johnson, Cincinnati Speech and Hearing Center

Planning program and staffing. George J. Fortune, Cleveland Hearing and Speech Center

Conducting educational training and research. Jack L. Bangs, Houston Speech and Hearing Center

Financing. William K. Ickes, Des Moines Hearing and Speech Center

Cooperating with other agencies in the community for the purpose of non-duplicated services. Alfred R. Thea, Constance Brown Society for Better Hearing

Discussion

DESIGN OBJECTIVES IN HEARING AIDS

2:00-3:25 p.m.

Chairman: Leo G. Doerfler, University of Pittsburgh

What have we learned from communication research which should be brought to bear upon the design of hearing aids? Earl D. Schubert, Cleveland Hearing and Speech Center

How can the electro-acoustic characteristics of hearing aids be measured, and what does this information mean? Edith Corliss, U. S. Bureau of Standards

What are the factors which one acoustical engineer considers in the design of his company's hearing aids? Samuel F. Lybarger, Radioear Corporation, Pittsburgh

Discussion

CONTRIBUTED PAPERS IN VOICE SCIENCE

3:30-4:55 p.m.

Chairman: Harlan Bloomer, University of Michigan

The effect of selective filtering on voice quality judgments. John Holway Ulrich and Aubrey Epstein, University of Pittsburgh

Relationship between resonant frequencies of the head cavities and fundamental frequency of the speaking voice. Willard R. Zemlin, University of Minnesota

Some observations about the energy source in spoken language. F. Lincoln D. Holmes, Illinois State Normal University

The nasalization of General American vowels. William D. Chapman, University of Michigan

Discussion

CURRENT RESEARCH ON EXAMINATION AND DIAGNOSIS OF ARTICULATION FROM THE THERAPIST'S VIEWPOINT

3:30-4:55 p.m.

Chairman: Robert Milisen, Indiana University

Responses to articulation testing and stimulation of school children not diagnosed as speech defective. William Rintelmann, Indiana University

Stimulability as a predictor of speech improvement for misarticulation by children receiving no therapy. Florence Filley, University of North Dakota

Auditory vs. visual stimulus in articulation testing. Jack Matthews and Betty Jane McWilliams, University of Pittsburgh

Correlation between two measures of articulation deficiency. Kathleen McDonnell, Normandy, Missouri Public Schools and William D. Trotter, Marquette University

The articulation of sounds in the medial position as compared to initial and final positions. Katherine Snow, Indiana University

THE HARD OF HEARING CHILD IN THE PUBLIC SCHOOLS

3:30-4:55 p.m.

Chairman: Glenn J. Taylor, Illinois State Normal University

The public school program for the hard of hearing in a large school system. Al Tudyman, Oakland Public Schools, California

Types of public school programs presently in existence in small school systems. Alice Streng, The University of Wisconsin

Preparation for teachers of the hard of hearing in the public schools. Genevieve Drennen, Illinois State Department of Public Instruction

The use of amplification in public school programs for the hard of hearing. Bruce Siegenthaler, Pennsylvania State University

Discussion

MASKING IN AUDIOMETRY

3:30-4:55 p.m.

Chairman: Earl D. Schubert, Cleveland Hearing and Speech Center

Auditory masking. Ira J. Hirsh, Central Institute for the Deaf
Masking in impaired ears. James F. Jerger, Northwestern University
Problems in clinical use of masking. LeRoy D. Hedgecock, Mayo Clinic
Discussion

General Session of the Association

8:00 p.m. Presidential Address
8:30 p.m. Business Meeting of the Association
Reports of Officers and Committees
Election of Officers and Council Members

Thursday, November 21

PRACTICAL MANAGEMENT OF VOICE DISORDERS

9:00-11:55 a.m.

Chairman: Henry M. Moser, Ohio State University

(The audience will observe conferences, diagnostic procedures, and therapy by way of closed circuit television from a nearby room. The participating teachers and clinicians will follow their presentations with discussions directly with the audience. Television is being used to provide real clinical and classroom situations which could not be offered otherwise.)

9:00 *Presentation and description of voice problems.*
Panel: Virgil Anderson, Stanford University; Harry Hollien, Baylor University; William Perkins, University of Southern California; and Gordon Peterson, University of Michigan
Discussion

9:30 *Conference with a new laryngectomee and his family.* John McClear, Bellevue Hospital and National Hospital of Speech Disorders
Discussion

10:00 *A lesson in esophageal speech.* Evelyn Y. Robe, Northwestern University
Discussion

10:30 *A group lesson for high school students with excessive nasality.* Helen S. Knight, Evanston Township High School, Evanston, Illinois
Discussion

11:00 *A lesson in fundamentals of good voice use for children.* Dorothy Kester, Board of Education, Akron, Ohio
Discussion

11:30 *The effect of speech improvement materials presented via television to children in kindergarten and first grade.* Hannah Matthews and Jack Matthews, University of Pittsburgh

THERAPY IN APHASIA

9:00-10:25 a.m.

Chairman: Irwin Brown, Hearing and Speech Center of Rochester

Speaker: Joseph M. Wepman, University of Chicago
Participants: Walter W. Amster, Veteran's Administration Hospital, New York City
Jon Eisenson, Queens College
Mary W. Huber, Los Angeles State College
Josephine Simonson, Mayo Clinic
Martha T. Taylor, N. Y. U. Bellevue Medical Center

COOPERATIVE PLANNING FOR THE SPEECH HANDICAPPED CHILD IN THE PUBLIC SCHOOLS

9:00-10:25 a.m.

Chairman: Mary Quirk, Dayton Public Schools, Ohio

Panel Members:

Speech Therapist—A. Elizabeth Miller, Youngstown Public Schools, Ohio
Principal—William Ramsey, Middletown Public Schools, Ohio
Parent—Helen DeChatelet, Oakwood, Ohio
Nurse—Ruth Murray, State Department of Social Administration, Columbus, Ohio
Classroom Teacher—Nancy Balger, Middletown Public Schools, Ohio
Psychologist—Alma Ward Jones, Dayton Public Schools, Ohio

RESIDENT SUMMER PROGRAMS IN SPEECH CORRECTION: ORGANIZATION AND MAINTENANCE

9:00-10:25 a.m.

Chairman: Severina Nelson, University of Illinois

The Illinois summer speech centers. Donald C. Davis, Augustana College, and John O. Anderson, Southern Illinois University

The Wisconsin program. Gretchen Phair, Wisconsin Bureau for Handicapped Children

Shady Trails Camp. John N. Clancy, University of Michigan

A new project in Alabama. Laura Wright, Alabama College

Easter Seal programs. Jayne Shover, National Society for Crippled Children and Adults

Discussion

SIGMA ALPHA ETA REPORTS OF SCHOLARLY PROJECTS

9:00-10:25 a.m.

Chairman: Wayne L. Thurman, Eastern Illinois State College

A hearing survey of seven county schools. Orville W. Martin, Alpha Lambda Chapter, Ohio State University

Implications for speech therapy in the physical education curriculum. Julie Bocklage, Omicron Chapter, St. Louis University

CONTRIBUTED PAPERS IN AUDIOLOGY

9:00-10:25 a.m.

Chairman: Kenneth O. Johnson, San Francisco Hearing and Speech Center

Deafness in childhood: retrospect and prospect. William G. Hardy and Mariam D. Pauls, Johns Hopkins Hospital

The development of clinical tests for binaural hearing. Moe Bergman, Hunter College and Maurice H. Miller, Columbia Presbyterian Medical Center

Clinical use of the aural overload and the tone decay tests as diagnostic tools. Gary Thompson and Richard Hoel, Houston Speech and Hearing Center

Standardization of the response of normal ears to automatic (Békésy) audiometry. Aubrey Epstein, University of Pittsburgh

Discussion

STUTTERING: GROUP THERAPY IN ACTION

10:30-11:55 a.m.

Chairman: Wendell Johnson, University of Iowa

Participants: Albert Murphy, Boston University
Dean Williams, Indiana University

Joseph G. Sheehan, University of California, Los Angeles
Jane Dorsey Zimmerman, Columbia University

Discussion

ACADEMIC PREPARATION FOR SPEECH AND HEARING THERAPISTS

10:30-11:55 a.m.

Chairman: James M. Mullendore, University of Virginia

Panel Members:
Virgil A. Anderson, Stanford University
Louis M. DiCarlo, Syracuse University
Frank B. Robinson, Miami University

(Note: This section is to be devoted to the problems encountered by those involved in the college training programs. Audience participation will constitute a major portion of the meeting.)

FEEDBACK EFFECTS IN LABORATORY AND CLINIC

10:30-11:55 a.m.

Chairman: T. D. Hanley, Purdue University

A study of changes in behavior under delayed auditory feedback in a population of children ages four through nine. Richard Allen Chase, Samuel Sutton, Daphne First, College of Physicians and Surgeons, Columbia University, Department of Otolaryngology, Columbia-Presbyterian Medical Center, Biometrics Research, New York State Department of Mental Hygiene.

Interaction effects of delayed feedback and auditory flutter. Henry E. Spuehler, Community Speech and Hearing Center, Enid, Oklahoma

Some effects of delayed sidetone on the rate and intelligibility of cerebral palsied speakers. James B. House, St. Cloud State College

Certain effects on speech of alterations in the auditory feedback of speech defectives and normals. Richard E. Ham, Ohio University

A comparison of the performances of normal hearing and hard of hearing persons on the delayed feedback task. Robert A. Butler, University of Chicago, and F. Thomas Galloway, Walter Reed Army Hospital

AIDS IN SPEECH DEVELOPMENT: WHAT SHALL WE DO WITH THE IMMATURE CHILD—THERAPY OR NOT?

10:30-11:55 a.m.

Chairman: Marian Elliott, Arlington Heights Public Schools, Illinois

Speech development with parent cooperation. Betty A. Neidecker and Marian Gilmore, Cleveland Speech and Hearing Center

Speech development with the regular classroom teacher. Ruth Curtis and Myra Brieve, Grosse Pointe Public Schools, Michigan

Speech development by the speech therapist through stimulation groups. Betty Jean Mouk, Cincinnati Public Schools

Discussion

PROFESSIONAL PROBLEMS: MEETING OF DIRECTORS OF SPEECH CORRECTION IN CITIES OVER 200,000

10:30-11:55 a.m.

Chairman: Ruth C. Proctor, New Orleans Public Schools

(Topics and participants to be added later)

OTOLOGICAL SURGERY

10:30-11:55 a.m.

Chairman: Hayes A. Newby, Stanford University

Reconstructive surgery in conductive deafness. Victor Goodhill, University of Southern California

Discussion

SIGMA ALPHA ETA LUNCHEON

12:15 P.M.

GOVERNMENT AGENCIES SUPPORTING PROGRAMS DEALING WITH THE HANDICAPPED

2:00-3:25 p.m.

Chairman: Stanley Ainsworth, University of Georgia

(Section incomplete)

PRIVATE SCHOOLS FACE PROBLEMS

2:00-3:25 p.m.

Chairmen: Rev. Jovian Lang, St. Joseph Seminary, Westmont, Illinois and Sister M. Cyprian Spradling, Catholic University of America

Recruitment of therapists as it pertains to major superiors. Rev. Jovian Lang, St. Joseph Seminary

Principles behind speech therapy on a Catholic liberal arts campus. Sister M. Clare Edward, College of St. Francis, Joliet

Organizing a speech clinic in a private school. Alfred J. Sokolnicki, Marquette University

Relating speech correction services to the private school system.

Discussion

PSYCHOACOUSTICS

2:00-3:25 p.m.

Chairman: James Jerger, Northwestern University

Psychoacoustics as a scientific discipline. Jozef Zwislocki, Harvard University

Discussant: Earl D. Schubert, Cleveland Hearing and Speech Center

Relationship between psychoacoustics and clinical audiology. J. Donald Harris, U. S. Naval Submarine Base, New London, Connecticut

Discussant: Robert Goldstein, Central Institute for the Deaf

CURRENT RESEARCH IN CLEFT PALATE SPEECH PROBLEMS

2:00-3:25 p.m.

Chairman: Sue Earnest, San Diego State College, California

Role of the pharyngeal flap in speech development in complicated cases of cleft palate as demonstrated by cineradiography with simultaneous sound recording. Herbert Conway, The New York Hospital

A study correlating consonant intelligibility with occlusal and velo-pharyngeal relationships in cleft palate speakers. Joanne D. Subtelny and J. Daniel Subtelny, Eastman Dental Dispensary, Rochester, New York.

Speech therapy techniques with preschool cleft palate children. Elise Hahn, University of California, Los Angeles

The effect of pitch and intensity level on perceived voice quality of male cleft palate speakers. Donald A. Hess, State Teachers College, Indiana, Pennsylvania

Discussant: Herbert Koepp-Baker, Highlands, North Carolina

LANGUAGE DEVELOPMENT FOR THE DEAF AND HARD OF HEARING

2:00-3:25 p.m.

Chairman: A. Bruce Graham, Henry Ford Hospital, Detroit

Receptive language development through speechreading. Mary Rose Costello, Henry Ford Hospital, Detroit

Receptive language development through reading. Miriam D. Pauls and Harriet L. Haskins, Johns Hopkins Hospital

Expressive language development through speech and voice training. Alice Kent, East Cleveland Public Schools

Development of connected language skills. Sister Jeanne d'Arc, St. Joseph's Institute for the Deaf, St. Louis

Discussion

CONTRIBUTED PAPERS IN PUBLIC SCHOOLS SPEECH THERAPY

3:30-4:55 p.m.

Chairman: Harlan Adams, University of Nebraska

Evaluation of methods aimed at increasing the effectiveness of public school speech therapy. Rolland J. Van Hattum, Rochester Public Schools, New York

Meeting parental needs in a speech examination. Asa Berlin and Eugene T. McDonald, Pennsylvania State University

Where do you hang your hat? Ruth M. DuPuis, Portland Public Schools, Oregon

Speech improvement in the public schools. John Mader, Michigan State University

Summary and comments: Stanley Ainsworth, University of Georgia

CONTRIBUTED PAPERS ON VOICE

3:30-4:55 p.m.

Chairman: I. P. Brackett, Southern Illinois University

The relationship between the vocal characteristics of men and their ratings of the vocal characteristics of other men. Roy E. Tew, University of Florida

Improving resonance and reducing excessive nasality. Loraine A. Wilson, Sunbeam School for Crippled Children, Cleveland, Ohio

Voice problems in a large public school system. Letitia Raubicheck, Bureau of Education of the Physically Handicapped, Board of Education, New York City

Laryngeal involvements in cerebral palsy. Martin Palmer, Institute of Logopedics

New information from voice research. James F. Curtis, State University of Iowa, Iowa City, Iowa

Discussion

SPEECH THERAPY FOR THE CEREBRAL PALSIED: MATERIALS, TECHNIQUES, AND EQUIPMENT

3:30-4:55 p.m.

Chairman: Atwood Hudson, Rockford College

Certain aspects of speech therapy for the school-aged child. Loraine A. Wilson, Sunbeam School for Crippled Children, Cleveland

Selected techniques and equipment for specific cases. Joan Kain Shaw, Bay State Rehabilitation Center, Springfield

Modern approaches of speech therapy. Martin Palmer, Institute of Logopedics, Wichita

Neurological measure of methods of therapy. Mildred F. Berry, Rockford College

Discussion

BRIEF PAPERS ON STUTTERING

2:00-4:30 p.m.

Chairman: John Moncur, State University Teachers College, Geneseo, New York

An approach to the self-concept in stuttering. Alonzo J. Morley, Brigham Young University, G. Don Davidson, Fresno State College and Sherwin Baer

Primary stuttering: an unlearned event. William H. Perkins, University of Southern California

The effect on stuttering of calling attention to the spasm. M. E. Wingate, University of Washington

The relationship of emotionality of speech content to speech performance under stress. Ernest L. Boyer, Upland College, California, and Victor P. Garwood, University of Southern California

Stuttering: a study of intensional and extensional definitions. M. A. Valentine, University of Colorado, Boulder, Colorado

Microscosmic theory: framework of reference for stuttering research and therapy. Sister Mary Cyprian Spradling, Catholic University of America

A homeostatic technique for secondary stuttering. E. James Lennon, State College of Washington

An appraisal of non-directive counseling as applied to adolescent and adult stutterers Robert F. Hejna, University of Connecticut

Use of Rorschach for prognosis and evaluation of therapy with stutterers. George Shames and Jack Matthews, University of Pittsburgh

Total Time: 85 minutes

Absolute 8-minute limit for each paper.

AUDIOLOGICAL RESEARCH IN THE ARMED FORCES

3:30-4:55 p.m.

Chairman: John C. Webster, U. S. Navy Electronics Laboratory, San Diego

Auditory thresholds of Air Force recruits. Max H. O'Connell, USAF School of Aviation Medicine, Randolph Field

A survey of hearing losses among Armor personnel. John L. Fletcher, Army Medical Research Laboratory, Fort Knox

Noise levels and hearing losses due to flight deck activity. W. Dixon Ward and Jerome R. Cox, Jr., USN School of Aviation Medicine, Pensacola, and Central Institute for the Deaf

Detecting and handling hearing loss cases in the Armed Forces. Hallowell Davis, Central Institute for the Deaf and National Research Council Armed Forces Committee on Hearing and Bio-Acoustics

FILM THEATER

7:30-10:30 p.m.

Chairman: John J. O'Neill, The Ohio State University

A mimeographed bibliography of the films being shown will be available for each member attending. The films will be grouped under the following categories: (a) speech, (b) hearing, and (c) miscellaneous.

SIGMA ALPHA ETA GENERAL ASSEMBLY

7:30 p.m.

Friday, November 22

PROFESSIONAL PROBLEMS: MEETING OF STATE DIRECTORS OF SPEECH CORRECTION

8:00-9:00 a.m.

Chairman: Elizabeth C. MacLearie, Ohio State Department of Education

Discussion Topic: *Standards for public school student teaching programs in speech and hearing therapy*

Discussion limited to state supervisors of speech and hearing therapy

APPROACHES TO THE LANGUAGE PROBLEMS OF BRAIN-INJURED CHILDREN

9:00-11:55 a.m.

Chairman: Robert Milisen, Indiana University

Attitudes and language behavior of Dr. McKenzie Buck after a cerebral vascular accident. McKenzie Buck, University of Florida

Current procedures for localizing brain damage in children and an experimental measure of a behavioral approach. Ralph Reitan, Indiana University Medical School

A class for preschool, brain-damaged, language-retarded children. Anne Rister, Houston, Texas

Speech and language developments in aphasoid, retarded children. Bernard B. Schlanger, Vineland Training School, New Jersey.

Current principles and methods in language therapy for brain-damaged children. Laura E. Lehtenin, Cove Schools, Evanston, Illinois

NON-DIRECTIVE PRINCIPLES AND METHODS OF ARTICULATION THERAPY

9:00-10:25 a.m.

Chairman: John V. Irwin, University of Wisconsin

Non-directive therapy with public school children. Dorothy Yeager, Wauwatosa, Wisconsin, Public Schools

Non-directive therapy with hard of hearing children. Kenneth Mangan, Gallaudet School for the Deaf, St. Louis

Non-directive therapy with aphasoid children. Vernon Smith, Wisconsin Department of Public Instruction

Non-directive therapy with mentally retarded children. Bernard B. Schlanger, The Training School, Vineland, New Jersey

Summary and Critique. Adah Miner, Shoreline Public Schools, Seattle

INTERDISCIPLINARY APPROACHES TO STUTTERING

Chairmen: C. Van Riper, Western Michigan College
Malcolm Fraser, Speech Foundation of America

Participants: C. S. Bluemel, Psychiatrist, Denver, Colorado
Arthur Hinman, Sociologist, University of Cincinnati
Charles R. Elliott, Psychologist, University of Illinois
Stanley Ainsworth, Speech Pathologist, University of Georgia

Time: 85 minutes

SPEECH FROM THE VIEWPOINT OF LINGUISTIC SCIENCE

9:00-10:25 a.m.

Chairman: William W. Fletcher, University of Minnesota

The specification of speech: what are the signals? Norman A. McQuown, Departments of Anthropology and Linguistics, University of Chicago

Accidental gaps in phonology. Sol Saporta, Department of Spanish and Portuguese, Indiana University

Regional variants: standard and non-standard. Raven I. McDavid, Department of English, University of Chicago

PSYCHOGALVANOMETRY

9:00-10:25 p.m.

Chairman: Bernard M. Anderman, Veterans Administration, Washington, D. C.

Objective speech audiometry: a new technique based on the galvanic skin response. Howard B. Ruhm, West Side V.A. Hospital, Chicago, and Raymond Carhart, Northwestern University

Objective speech audiometry in cases of functional hearing loss. Otto J. Menzel and Howard B. Ruhm, West Side V.A. Hospital, Chicago

The effects of varying the strength of the unconditioned stimulus upon the galvanic skin response. Leo G. Doerfler, University of Pittsburgh and Joan C. Kramer, Cincinnati Speech and Hearing Center

The effect of shock not preceded by audible tones on conditioned electrodermal responses in clinical audiometry. Robert Goldstein and Akira Totoki, Central Institute for the Deaf

Discussion

CURRENT RESEARCH ON EXAMINATION AND DIAGNOSIS OF ARTICULATION FROM THE SPEECH SCIENTIST'S VIEWPOINT

10:30-11:55 a.m.

Chairman: James Curtis, State University of Iowa

(Section incomplete)

LARYNGEAL PHYSIOLOGY

10:30-11:55 a.m.

Chairman: Paul Moore, Northwestern University

Laryngeal paralysis and laryngeal surgery. William C. Thornell, Cincinnati

Surgery? Voice training? Hans von Leden, Chicago

Discussion

GUIDING THE NON-FLUENT CHILD IN THE ELEMENTARY SCHOOL

10:30-11:55 a.m.

Chairman: Leroy T. Laase, University of Nebraska

Discussion will cover the therapist's responsibility to the non-fluent child, including parent conferences and teacher conferences. Parents' reaction to interrogation on information of a personal nature and the degree to which therapists are equipped to handle problems of a psychiatric and psychological nature will also be included.

Discussants: Wendell A. Johnson, University of Iowa
Ruth Curtis, Grosse Pointe Public Schools, Michigan
Charles L. Jennings, Ohio State University

MEASUREMENTS OF RECRUITMENT

10:30-11:55 a.m.

Chairman: John W. Keys, University of Oklahoma

Alternate and simultaneous binaural balancing in pathological ears. Earl R. Harford and James F. Jerger, Northwestern University

Alternate and simultaneous binaural balancing in masked normal ears. James F. Jerger and Earl R. Harford, Northwestern University

Influence of stimulus duration upon differential intensity sensitivity. Philip E. Rosenberg, Temple University

The Denes-Naunton DL test. Ralph F. Naunton, University of Chicago

Discussion

BUSINESS MEETING

2:00-3:25 p.m.

MEETING OF THE EXECUTIVE COUNCIL

3:00 p.m.

EVALUATION OF SPEECH DEVELOPMENT AND SPEECH DELAY IN CHILDREN

3:30-4:55 p.m.

Chairman: John M. Palmer, University of Washington

The construction and trial study of a language test for children. Margaret Crabtree, School for Aphasic Children, Houston, Texas

A developmental profile as a diagnostic aid for delayed speech. Herold Lillywhite, University of Oregon Medical School

An exploratory method for assessing language retardation. Louis Lerea, Northern Illinois State College

A study of the causal relationships between disordered speech and emotional problems in children. Empress Zedler, Southwest Texas State College

A descriptive analysis of the communicative behavior of five psychotic children prior to and following speech therapy. Betty Jane McWilliams and Jesse Good, University of Pittsburgh

Discussion

STUDIES IN NASALITY IN CLEFT PALATE SPEAKERS

3:30-4:55 p.m.

Chairman: Victor Garwood, University of Southern California

A study of the relationship between nasality in isolated vowels and the connected speech of cleft palate speakers. Gene R. Powers, University of Iowa

A review of some factors which influence ratings of nasality in cleft palate speakers. Alvin J. Davis and Eugene T. McDonald, The Pennsylvania State University

Measurements of palatal pharyngeal function in relation to voice. William Wolski, Eugene Walle, and Harlan Bloomer, University of Michigan

Nasality and nasal emission in preschool, cleft palate subjects. Kenneth Bzoch, Northwestern University

Cineradiographic and spectrographic analyses of nasality in cleft palate subjects. Robert Millard, Cleft Palate Clinic, Lancaster, Penn.

CONTRIBUTED PAPERS IN CEREBRAL PALSY

3:30-4:55 p.m.

Chairman: Mildred F. Berry, Rockford College

A study of the breathing and speech of seven athetoid children and the subsequent effects of a superimposed respiratory pattern. William A. Plotkin, University of Illinois School of Medicine

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Listener adaptation to cerebral palsy speech problems. William D. Trotter, Marquette University

A comparison of the speech and language development of a selected group of young educable athetoid and spastic quadriplegic children. Margaret C. Byrne, University of Kansas

Teaching communications skills to the severely involved cerebral palsied child. John K. Duffy, Brooklyn College

Communication in the clinic. Elwood Murray, University of Denver

Discussion

INTELLIGIBILITY STUDIES

3:30-4:55 p.m.

Chairman: John W. Black, The Ohio State University

The relative intelligibility of single-voice and multiple-voice messages under various conditions of noise. Robert W. Peters, Mississippi Southern College

The prediction of selected criteria from selected measures of the consonant articulation abilities of young adult, cerebral palsy subjects. Ernest Burgi and Jack Matthews, University of Pittsburgh

Delayed response—its effect upon speech reception and speaker intelligibility. Gilbert C. Tolhurst, The U. S. Naval School of Aviation Medicine

The influence of various relative levels of bone-conducted to air-conducted speech upon listener reception scores. Robert L. McCroskey, Jr., Mississippi Southern College

EXPERIMENTS IN 'OBJECTIVE' AUDIOMETRY

3:30-4:55 p.m.

Chairman: E. Thayer Curry, University of Illinois

The magnitudes of galvanic skin resistance responses that occur with different intensity levels of shock, conditioned tone, and extinction tone. E. Harris Nober, Ohio State University

Frequency of electrodermal responses (EDR) to sound near threshold as a function of intensity, EEG pattern, and sex. Robert C. Bilger, Benjamin Rosenblüt, and Robert Goldstein, Central Institute for the Deaf

Some observations of the use of objective audiometry as applied to conditioned somatic responses. Alan S. Feldman, Massachusetts Eye and Ear Infirmary

Objective confirmation of auditory thresholds in adults with hearing losses. Robert Goldstein and Akira Totoki, Central Institute for the Deaf

Discussion

1957-58 NATIONAL EXECUTIVE COUNCIL, SIGMA ALPHA ETA

Friday, November 22, 7:00 p.m.